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Harvard University.

Bulletin of the Museum of Comparative Zoölogy,
AT HARVARD COLLEGE.
VOL. XVIII.

REPORTS ON THE RESULTS OF DREDGING, UNDER THE SUPERVISION OF ALEXANDER AGASSIZ, IN THE GULF OF MEXICO (1877–78) AND IN THE CARIBBEAN SEA (1879–80), BY THE U. S. COAST SURVEY STEAMER "BLAKE," LIEUT.-COMMANDER C. D. SIGSBEE, U. S. N., AND COMMANDER J. R. BARTLETT, U. S. N., COMMANDING.

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XXIX. — REPORT ON THE MOLLUSCA.

BY W. H. DALL.

PART II. — GASTROPODA AND SCAPHOPODA.

WITH THIRTY-ONE PLATES.

CAMBRIDGE:
PRINTED FOR THE MUSEUM.
JUNE, 1889.

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Reports on the Results of Dredging, under the Supervision of ALEXANDER AGASSIZ, *in the Gulf of Mexico* (1877–78) *and in the Caribbean Sea* (1879–80), *by the U. S. Coast Survey Steamer "Blake,"* LIEUT.-COMMANDER C. D. SIGSBEE, U. S. N., *and* COMMANDER J. R. BARTLETT, U. S. N., *Commanding.*

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XXIX.

Report on the Mollusca, by W. H. DALL. — Part II. *Gastropoda and Scaphopoda.*

THE reader of this Report, for various details as to its origin, progress, and results, is referred to the introductory remarks prefixed to Part I. (Bull. Mus. Comp. Zoöl., Vol. XII, No. 6, pp. 171–186.) His attention is especially called to the remarks upon nomenclature (p. 175), and the acknowledgments for indebtedness to other scientific men and their publications.

In the present portion of the Report, the material offered by the Blake Collection has been materially supplemented by the southern dredgings of the U. S. Fish Commission Steamer "Albatross," and other material collected in the region and now in the National Museum. It was the original intention of the writer to make this Report a summary to date of deep-sea research and faunal exploration of the geographical province extending from Brazil to Cape Hatteras. But the material has been collected so rapidly, and the study of it leads to such unexpected conclusions, in many cases, that it has been impracticable to do this for all the families. A general bathymetrical review may be attempted later; the present paper contains data for any one ambitious to make the attempt at once, but the writer prefers to defer it until the results of the later dredgings of the Fish Commission and of the French expeditions are at hand, to be combined into a paper which shall represent the latest information on the subject.

However, in the following Report will be found in several instances a complete though brief review of all the species of a group known to inhabit the region above defined, at any depth. Especial attention has been paid to an enumeration of the valid species of our southern coasts, so neglected for the last quarter of a century. But in families or genera comprising a large multitude of species, such as the *Pleurotomidæ*, this has been impracticable, and has not been attempted.

The Systematic List which precedes the text, while it enumerates those species which are new, newly named, or treated of at length, whether of the Blake Collection or merely illustrative of it, does not include the numerous other species which are only incidentally referred to or enumerated in generic summaries of the southern fauna.

The present paper includes a systematic description and account of the Gastropods* and Scaphopods comprised in the Blake Collection, (excepting pelagic species which float on the surface,) illustrated by data drawn from the collections of the U. S. Fish Commission made south of Cape Hatteras. In the course of this account the nomenclature has been discussed and rectified in several cases. In other cases the generic names and arrangements commonly in use have been adopted as they are found in the text-books, for want of time and material to revise the ordinary classification if necessary. Anatomical details have been supplied whenever the material was available and the interest of the subject seemed to warrant it. These details will be found, as in Part I, under the heads of the respective genera and species. They are too numerous to particularize. Perhaps those of most general interest relate to the soft parts of *Pleurotomaria*, of the *Volutidæ* of the Gulf of Mexico, of *Pedicularia*, of certain forms connected with *Cerithiopsis*, and of the various Limpets. The writer has been handicapped by the impossibility of getting an artist competent to make suitable drawings from the magnified camera lucida sketches of anatomy, dentition, etc., and has been obliged to leave unillustrated many of the points which he has described at length in the text. It has been impossible, with his official engagements, for him personally to elaborate these drawings. To Dr. J. C. McConnell he has been indebted for admirable renderings of the shells, as heretofore.

In addition to the acknowledgments made in Part I, the writer desires to express his indebtedness to the great quarto report on the Gastropoda of the Challenger Expedition, by the Rev. Robert Boog-Watson; to the admirable Manual by Dr. Paul Fischer, recently concluded; and to the Manual which Mr. George W. Tryon, of Philadelphia, projected, and had largely carried out at the time of his premature decease.

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* The few Nudibranchs collected have been referred to Dr. R. Bergh, who will report upon them separately.

In the course of this Report the writer has freely criticised the literature which he was required to consult, not with any desire of fault-finding, but because frank and free criticism is, it seems to him, the most desirable way of getting at the truth. During Mr. Tryon's lifetime the writer felt obliged on several occasions rather sharply to criticise the execution of some parts of that gentleman's Manual, and it gives him pleasure to say, now that Death has intervened, that this criticism never interrupted the friendly relations which mutually existed and continued to exist. Mr. Tryon, without entering into controversy, took steps to remedy such of the faults as he felt to be justly criticised, and a comparison of the later volumes of the Manual with the earlier ones will sufficiently illustrate the result. The work is important, and almost indispensable, while from its very nature it is especially liable to minor inaccuracies. For this reason the writer has not eliminated any of the criticisms or corrections from his manuscript prepared during Mr. Tryon's lifetime, and which now is printed. He believes that his friend would prefer that all just and fair corrections should be made, and that the science to which he was thoroughly devoted should thus be advanced. Well aware that he himself may in turn offer a fair target for the critic, the writer invites corrections which may suggest themselves to other malacologists.

A summary of the numerical results of this investigation into the Antillean and Gulf fauna will be found at the end of this paper, where it is placed in order that it may express the latest and most accurate figures. These data are, as every one knows, liable to be slightly modified in the course of printing and proof-reading.

In this Report all dimensions are given in millimeters; all temperatures are bottom temperatures, and expressed in degrees Fahrenheit. The measurements of a shell are made parallel with the axis, the curve of the profile not being taken into account. The term *longitudinal* in description is equivalent to *spiral*, and indicates a direction parallel with the coil of the whorl. The term *transverse* refers to sculpture crossing the whorls in general parallelism with the longitudinal central axis of the whole shell. The *nucleus* is the larval shell, be the same large or small. The *apex* of the spire is considered to be the *posterior*, the end of the canal to be the *anterior* end of the shell, and all terms indicating direction are to be understood in harmony with this definition. Right and left, when used, are used as if the animal were crawling, with his head away from the observer, on a plane at right angles to the line of sight.

The figures after the references to the plates indicate the longest diameter of the shell in the position in which it is figured, whether this be height or diameter actually, unless it be otherwise stated. As a rule "alt." is prefixed to statements of dimension which refer to height of the spire, and "lat." or "diam." to the measurements taken at right angles to the axis of the spire.

The nomenclature adopted is based on the rules of the British Association, as illustrated by the Report of the American Association in 1877, and the subsequent contributions of De Candolle and the American Ornithologist's Union. I have not seen any more recent discussions of the subject which go far enough into it to be of much importance. Such a report as that of the Bologna Geological Congress is so inadequate as to carry no weight; the so-called rules being essentially superficial and insufficient to meet the needs of the conscientious student of nomenclature.

The relation of the deep-sea fauna to the fauna of the Tertiaries is more intimate in some respects than that of the Tertiaries to the recent fauna of the litorale. A number of genera and subordinate groups hitherto known only from the Tertiary deposits will be found enumerated among the forms collected by the "Blake" and "Albatross."

The Index will contain references to the species mentioned in both Part I and Part II, and the plates are continuously numbered in the two papers. The preliminary descriptions of Bulletin M. C. Z., Vol. IX, No. 2, 1881, which are not reprinted, were provided with an index of their own.

For the student interested in the fauna of the southern coasts of the United States, this report will contain more new information than has appeared in any single publication for many years. The writer hopes that it may stimulate in some measure the interest in that fauna which its richness, its possibility of novelties to come, and its relations with the fauna of the Antilles, may reasonably lead us to expect. There is no department of biology where more remains to be done than among the *Mollusca*, and it is in the power of any good observer, whether scientifically trained or not, to add to the sum of our knowledge, and materially aid in the reformation of the present unsatisfactory systems.

WASHINGTON, D. C., June, 1888.

SYSTEMATIC LIST OF SPECIES.

[Species marked with an asterisk were not contained in the Blake Collection, or are referred to for purposes of illustration, etc.]

CLASS GASTROPODA.

SUBCLASS ANISOPLEURA.

Order OPISTHOBRANCHIATA.

Suborder TECTIBRANCHIATA.

FAMILY ACTÆONIDÆ.

Genus ACTÆON MONTFORT.

Actæon exilis Jeffreys.*
Actæon pusillus Jeffreys.
Actæon punctostriatus Adams.*
Actæon Cumingii A. Adams.*
Actæon delicatus Dall.
Actæon melampoides Dall.
Actæon perforatus Dall.
Actæon Danaida Dall.
Actæon incisus Dall.

Genus OVULACTÆON DALL.

Ovulactæon Meekii Dall.

FAMILY RINGICULIDÆ.

Genus RINGICULA DESHAYES.

Section RINGICULINA Monterosato.

Ringicula nitida Verrill.
Ringicula floridana Dall.*
Ringicula floridana var. *Guppyi* Dall.*

FAMILY TORNATINIDÆ.

Genus **TORNATINA** A. ADAMS.

Subgenus COLEOPHYSIS FISCHER.

Coleophysis perplicatus Dall.

Subgenus CYLICHNELLA GABB.

Cylichnella bidentata Orbigny.

Genus **UTRICULUS** BROWN.

Utriculus Mayoi Dall.*
Utriculus Frielei Dall.
Utriculus vortex Dall.
Utriculus (vortex var.?) **domitus** Dall.
Utriculus pervius Dall.*

Subgenus RETUSA (BROWN) MÖRCH.

Retusa ovata Jeffreys.*
Retusa obesiuscula Brugnone.*

Genus **VOLVULA** A. ADAMS.

Volvula acuta Orbigny.
Volvula oxytata Bush.*
Volvula Bushii Dall.*
Volvula aspinosa Dall.*

FAMILY SCAPHANDRIDÆ.

Genus **SCAPHANDER** MONTFORT.

Scaphander punctostriatus Mighels, var. *clavus* Dall.
Scaphander Watsoni Dall.

Subgenus SABATIA BELLARDI.

Sabatia bathymophila Dall.

Genus **ATYS** MONTFORT.

Atys Sandersoni Dall.

Genus **CYLICHNA** LOVÈN.

Cylichna Verrillii Dall.*

Family BULLIDÆ.

Genus BULLA Linné.

Bulla? eburnea Dall.
Bulla occidentalis A. Adams.
Bulla abyssicola Dall.
Bulla Krebsii Dall.
Bulla clausa Dall.*

Genus HAMINEA Leach.

Haminea succinea Conrad.

Family PHILINIDÆ.

Genus PHILINE Ascanias.

Philine infundibulum Dall.
Philine planata Dall.
Philine flexuosa M. Sars.

Family GASTROPTERIDÆ.

Genus GASTROPTERON Meckel.

Gastropteron *sp. indet.*

Family UMBRACULIDÆ.

Genus UMBRACULUM Schumacher.

Umbraculum bermudense Mörch ?

Subgenus HYALOPATINA Dall.

Hyalopatina Rushii Dall.*

Super-Order PROSOBRANCHIATA.

Order PECTINIBRANCHIATA.

Super-Family TOXOGLOSSA.

Family TEREBRIDÆ.

Genus TEREBRA Lamarck.

Section EURYTA.

Terebra aciculata Lamarck.*

Section HASTULA.

Terebra hastata Gmelin.*
Terebra cinerea Gmelin.*

Section SUBULA.

Terebra floridana Dall.*

Section ACUS.

Terebra dislocata Say.*
Terebra concava Say.*
Terebra concava var. *vinosa* Dall.*
Terebra protexta Conrad.*
Terebra protexta var. *lutescens* (Smith ?) Dall.*
Terebra nassula Dall.
Terebra limatula Dall.*
Terebra limatula var. *acrior* Dall.
Terebra benthalis Dall.
Terebra Rushii Dall.*

Family CONIDÆ.

Genus CONUS Linné.

Conus Mazei Deshayes.
Conus cedonulli Lamarck.
Conus proteus Hwass.
Conus Pealei Green.*
Conus Agassizii Dall.
Conus Villepini F. & B.
Conus daucus Hwass.
Conus centurio Born.
Conus flavescens Gray.
Conus amphiurgus Dall.*

Family PLEUROTOMIDÆ.

Genus PLEUROTOMA Lamarck.

Subgenus PLEUROTOMA s. s.

Pleurotoma albida Perry.
Pleurotoma albida var. *tellea* Dall.*
Pleurotoma albida var. *vibex* Dall.
Pleurotoma periscelida Dall.*

Subgenus LEUCOSYRINX Dall.

Leucosyrinx Verrillii Dall.
Leucosyrinx Sigsbeei Dall.

Leucosyrinx tenoceras Dall.
Leucosyrinx subgrundifera Dall.

Subgenus ANCISTROSYRINX Dall.

Ancistrosyrinx elegans Dall.
Ancistrosyrinx radiata Dall.

Subgenus GENOTA Adams.

Genota mitrella Dall.

Section DOLICHOTOMA Bellardi.

Genota viabrunnea Dall.

Genus DRILLIA Gray.

Drillia ostrearum Stearns.
Drillia Tryonii Dall.
Drillia albicoma Dall.
Drillia detecta Dall.
Drillia alesidota Dall.*
Drillia alesidota var. *macilenta* Dall.
Drillia polytorta Dall.
Drillia eucosmia Dall.
Drillia eucosmia var. *canna* Dall.
Drillia haliostrephis Dall.
Drillia acestra Dall.
Drillia pharcida Dall.*
Drillia acrybia Dall.
Drillia tristicha Dall.*
Drillia ebur Reeve.
Drillia fucata Reeve.*
Drillia pagodula Dall.
Drillia pagodula var. *pentagonalis* Dall.
Drillia coccinata Reeve.
Drillia thea var. *carminura* Dall.
Drillia Simpsoni Dall.*
Drillia lissotropis Dall.
Drillia Dalli Verrill.
Drillia Dalli var. *acloneta* Dall.
Drillia Dalli var. *cestrota* Dall.
Drillia nucleata Dall.
Drillia Verrillii Dall.
Drillia havanensis Dall.
Drillia premorra Dall.
Drillia oleacina Dall.
Drillia smirna Dall.
Drillia lithocolleta Watson.

Section CYMATOSYRINX Dall.

Drillia centimata Dall.
Drillia æpynota Dall.*
Drillia Moseri Dall.

Genus BORSONIA Bellardi.

Subgenus BORSONIA s. s.

Borsonia ceroplasta Watson.

Subgenus CORDIERIA Rouault.

Cordieria Rouaultii Dall.

Genus MANGILIA Risso.

Subgenus AFORIA Dall.

Aforia circinata Dall.*
? **Aforia hypomela** Dall.*

Subgenus CYTHARA Schumacher.

Cythara Bartlettii Dall.
Cythara cymella Dall.

Subgenus DAPHNELLA Hinds.

Section DAPHNELLA s. s.

Daphnella leucophlegma Dall.
Daphnella corbicula Dall.
Daphnella reticulosa Dall.
Daphnella pompholyx Dall.
Daphnella retifera Dall.*
Daphnella morra Dall.
Daphnella elata Dall.*

Section EUBELA Dall.

Daphnella limacina, Dall.
Daphnella calyx Dall.*
Daphnella sofia Dall.
Daphnella sofia var. *hyperlissa* Dall.*

Subgenus GLYPHOSTOMA Gabb.

Glyphostoma dentifera Gabb.
Glyphostoma Gabbii Dall.
Glyphostoma gratula Dall.
Glyphostoma phalera Dall.*

Subgenus MANGILIA Risso s. s.

Mangilia caribæa Orbigny.

Mangilia Lavalleana Orbigny.
Mangilia atrostyla Dall.
Mangilia quadrata Reeve.*
Mangilia quadrata var. *diminuta* Adams.*
Mangilia quadrata var. *rugirima* Dall.*
Mangilia quadrata var. *monocingulata* Dall.
Mangilia serga Dall.
? **Mangilia halitropis** Dall.
? **Mangilia ipara** Dall.
? **Mangilia peripla** Dall.
? **Mangilia elusiva** Dall.
Mangilia bandella Dall.
Mangilia antonia Dall.
Mangilia comatotropis Dall.
Mangilia scipio Dall.
Mangilia pelagia Dall.
? **Mangilia exsculpta** Watson.
? **Mangilia Pourtalesii** Dall.
? **Mangilia subsida** Dall.
Mangilia toreumata Dall.

Subgenus PLEUROTOMELLA Verrill.

Pleurotomella Packardi Verrill.*
Pleurotomella Packardi var. *formosa* Jeffreys.
Pleurotomella Packardi var. *Benedicti* V. & S.
Pleurotomella leucomata Dall.
Pleurotomella Agassizii V. & S. var. *mexicana* Dall.*
Pleurotomella Edgariana Dall.*
Pleurotomella Emertonii V. & S.
Pleurotomella chariessa Watson.
Pleurotomella chariessa var. *spica* Dall.*
Pleurotomella chariessa var. *phalera* Dall.*
Pleurotomella chariessa var. *tellea* Dall.*
Pleurotomella chariessa var. *aresta* Dall.*
Pleurotomella filifera Dall.
Pleurotomella catasarca Dall.
Pleurotomella hadria Dall.*

Section ? GYMNOBELA Verrill.

Pleurotomella extensa Dall.
Pleurotomella Blakeana Dall.
Pleurotomella Blakeana var. *agria* Dall.
Pleurotomella tornata Verrill var. *Malmii* Dall.

Subgenus TARANIS Jeffreys.

Taranis cirrata Brugnone.*

FAMILY CANCELLARIIDÆ.

Genus CANCELLARIA LAMARCK.

Subgenus CANCELLARIA s. s.

Cancellaria reticulata Linné.
Cancellaria venusta Tuomey & Holmes.*

Subgenus TRIGONOSTOMA BLAINVILLE.

Trigonostoma tenera Philippi.*
Trigonostoma Smithii Dall.*
Trigonostoma Agassizii Dall.*
Trigonostoma? microscopica Dall.*

Genus BENTHOBIA DALL.

Benthobia Tryoni Dall.*

Super-Family RHACHIGLOSSA.

FAMILY OLIVIDÆ.

Genus OLIVA BRUGIÈRE.

Oliva reticularis Lamarck.
Oliva literata Lamarck.

Genus OLIVELLA SWAINSON.

Olivella mutica Say.
Olivella fuscocincta Dall.
Olivella jaspidea Gmelin.
Olivella jaspidea var. *rotunda* Dall.
Olivella bullula Reeve.
Olivella (bullula var. ?) **tubulata** Dall.

FAMILY MARGINELLIDÆ.

Genus MARGINELLA LAMARCK.

Marginella apicina Menke.
Marginella Watsoni Dall.
Marginella amabilis Redfield.
Marginella rostrata Redfield.
Marginella cassis Dall.

Marginella hæmatita Kiener.
Marginella fusina Dall.
Marginella yucatecana Dall.
Marginella opalina Stearns.
Marginella seminula Dall.
Marginella Redfieldii Tryon.
Marginella fusca Sowerby.
Marginella succinea Conrad.
Marginella styria Dall.
Marginella torticula Dall.

Subgenus VOLVARINA Hinds.

Volvarina avena Val.
Volvarina avena var. *guttula* Reeve.
Volvarina albolineata Orbigny.
Volvarina subtriplicata Orbigny.
Volvarina pallida Donovan.

Subgenus VOLUTELLA Swainson.

Volutella lacrimula Gould.
Volutella hadria Dall.*
Volutella amianta Dall.*

Genus PERSICULA Schumacher.

Persicula catenata Montagu.

Subgenus GIBBERULA Swainson.

Gibberula minuta Pfr.

Family VOLUTIDÆ.

Genus VOLUTA Linné.

Voluta musica Linné.*
Voluta virescens Solander.*

Genus SCAPHELLA Swainson (em.).

Scaphella junonia Hwass.

Subgenus AURINIA Adams.

Aurinia dubia Broderip.
Aurinia robusta Dall.*
Aurinia Gouldiana Dall.*

FAMILY MITRIDÆ.

Genus MITRA LAMARCK.

Mitra Swainsoni Broderip.
Mitra fulgurita Reeve.
Mitra straminea A. Adams.
Mitra styria Dall.
Mitra Deshayesii Reeve ?
Mitra Rushii Dall.
Mitra trophonia Dall.
Mitra Bairdii Dall.*
Mitra torticula Dall.

Subgenus CONOMITRA CONRAD.

Conomitra Blakeana Dall.
Conomitra Blakeana var. *lœvior* Dall.

Genus MITROMORPHA ADAMS.

Mitromorpha biplicata Dall.

FAMILY FASCIOLARIIDÆ.

SUBFAMILY FUSINÆ.

Genus FUSUS LAMARCK.

Fusus timessus Dall.*
Fusus eucosmius Dall.
Fusus Couei Petit.*
Fusus distans var. *closter* Philippi.*
Fusus halistreptus Dall.*
Fusus benthalis Dall.
Fusus amiantus Dall.
Fusus æpynotus Dall.
Fusus alcimus Dall.
Fusus alcimus var. *Rushii* Dall.*
Fusus ceramidus Dall.
Fusus amphiurgus Dall.

SUBFAMILY FASCIOLARIINÆ.

Genus FASCIOLARIA LAMARCK.

Fasciolaria distans Lamarck.

Subgenus MESORHYTIS MEEK.

Mesorhytis Meekiana Dall.

Genus MAZZALINA Conrad.

Mazzalina pyrula Conrad.*

Genus LIOCHLAMYS Dall.

Liochlamys bulbosa Heilprin.*

Genus LATIRUS Montfort.

Latirus cingulifera Lamarck.*

Family BUCCINIDÆ.

Subfamily CHRYSODOMINÆ.

Genus CHRYSODOMUS Swainson.

Subgenus SIPHO Mörch.

Sipho Rushii Dall.*
Sipho globulus Dall.*

Genus LIOMESUS Stimpson.

Liomesus Stimpsoni Dall.*

Subfamily BUCCININÆ.

Genus PISANIA Bivona.

Subgenus TRITONIDEA Swainson.

Tritonidea limbata Philippi.*

Genus PHOS Montfort.

Phos unicinctus Say.*
Phos Beaui F. & B.
Phos Candei Orbigny.
Phos parvus C. B. Adams.*
Phos parvus var. *intricatus* Dall.*

Genus NASSARIA Link.

Subgenus NASSARINA Dall.

Nassarina glypta Bush.*
Nassarina Bushii Dall.
Nassarina columbellata Dall.*
Nassarina Grayi Dall.

FAMILY NASSIDÆ.

Genus NASSA Lamarck.

Nassa ambigua Montagu.
Nassa consensa Ravenel.
Nassa Hotessieri Orbigny.
Nassa scissurata Dall.
Nassa scissurata var. *pernitida* Dall.

FAMILY COLUMBELLIDÆ.

Genus COLUMBELLA Lamarck.

Columbella rusticoides Heilprin.*
Columbella mercatoria Lamarck.

Subgenus EUPLICA Dall.

Euplica turturina Duclos.*

Subgenus ANACHIS H. & A. Adams.

Anachis avara Say.*
Anachis avara var. *semiplicata* Stearns.*
Anachis avara var. *translirata* Ravenel.*
Anachis avara var. *similis* Ravenel.*
Anachis catenata Sowerby.
Anachis haliaeti Jeffreys.*
Anachis albella C. B. Adams.*
Anachis albella var. *samanensis* Dall.*
Anachis pulchella Kiener.*
Anachis obesa C. B. Adams.
Anachis obesa var. *ostreicola* Melvill.*
Anachis Hotessieriana Orbigny.*
Anachis amphissella Dall.

Subgenus NITIDELLA Swainson.

Nitidella nitidula Sowerby.*
Nitidella moleculina Duclos var. *dicomata* Dall.*

Subgenus ASTYRIS Adams.

Astyris lunata Say.*
Astyris Raveneli Dall.*
Astyris multilineata Dall *
Astyris rosacea Gould.*
Astyris fusiformis Orbigny.*

Astyris diaphana Verrill.
Astyris profundi Dall.
Astyris Verrillii Dall.
Astyris Verrillii var. *strix* Watson.*
Astyris Saintpairiana Caillet.
Astyris Duclosiana Orbigny.

Subgenus ÆSOPUS Gould.

Æsopus Stearnsii Tryon.*
Æsopus Metcalfei Reeve.*

Family MURICIDÆ.

Subfamily MURICINÆ.

Genus MUREX Linné.

Subgenus MUREX s. s.

Murex Beaui F. & B.
Murex Cabritii Bernardi.
Murex elegans Beck.
Murex messorius Sowerby.
Murex nodatus Reeve.
Murex Cailleti Petit.

Subgenus CHICOREUS Montfort.

Chicoreus Hidalgoi Crosse.

Subgenus PHYLLONOTUS Swainson.

Phyllonotus fulvescens Sowerby.*
Phyllonotus pomum Gmelin.
Phyllonotus interserratus Sowerby.
Phyllonotus Pazi Crosse.
Phyllonotus hystricinus Dall.

Subgenus PTERONOTUS Swainson.

Pteronotus macropterus Deshayes.*
Pteronotus phaneus Dall.*
Pteronotus tristichus Dall.

Genus EUPLEURA H. & A. Adams.

Eupleura caudata Say.*
Eupleura Stimpsonii Dall.

Genus TROPHON Montfort.

Subgenus BOREOTROPHON Fischer.

Boreotrophon Dalli Kobelt.*
Boreotrophon (**aculeatus** Watson var.?) **lacunella** Dall.
Boreotrophon ? actinophorus Dall.

Subgenus ASPELLA Mörch.

Aspella anceps Lamarck.*
Aspella hastula Reeve.*
Aspella scalarioides Blainville.*
Aspella scalarioides var. *obeliscus* A. Adams.*
Aspella scalarioides var. *pauperculus* C. B. Adams.*

Genus OCINEBRA Leach.

Subgenus FAVARTIA Fischer.

Favartia cellulosa Conrad.
Favartia levicula Dall.*
Favartia intermedia C. B. Adams.*

Genus MURICIDEA (Swainson) Mörch.

Muricidea hexagona Lamarck.
Muricidea floridana Conrad.*
Muricidea multangula Philippi.*
Muricidea Philippiana Dall.*

Genus UROSALPINX Stimpson.

Urosalpinx cinereus Say.*
Urosalpinx tampaensis Conrad.*
Urosalpinx perrugatus Conrad.*
Urosalpinx ? carolinensis Verrill.*
Urosalpinx ? macra Verrill.*

Genus TYPHIS Montfort.

Section TYPHIS s. s.

Typhis floridanus Dall.*

Section TRUBATSA Dall.

Typhis longicornis Dall.

SUBFAMILY PURPURINÆ.

Genus SISTRUM Montfort.

Subgenus SISTRUM s. s.

Sistrum ferrugineum Reeve var. *rubidum* Dall.*

SUBFAMILY CORALLIOPHILINÆ.

Genus CORALLIOPHILA H. & A. ADAMS.

Coralliophila Deburghiæ Reeve.
Coralliophila bracteata Brocchi.*
Coralliophila galea Chemnitz.*
Coralliophila lactuca Dall.

Super-Family TÆNIOGLOSSA.

FAMILY TRITONIIDÆ.

Genus DISTORTRIX LINK.

Distortrix reticulata Link.
Distortrix reticulata var. *clathrata* Bolten.
Distortrix reticulata var. *reticulata* Link.

Genus GYRINEUM LINK.

Gyrineum affine Broderip.
Gyrineum affine var. *cubanianum* Orbigny.

Genus TRITONIUM LINK.

Subgenus COLUBRARIA SCHUMACHER.

Colubraria lanceolata Menke.
Colubraria Swiftii Tryon.

Subgenus RANULARIA SCHUMACHER.

Ranularia tuberosa Lamarck.*

Subgenus LAMPUSIA SCHUMACHER.

Lampusia chlorostoma Lamarck.
Lampusia pileare Lamarck.*
Lampusia gracile Reeve.
Lampusia pharcida Dall.

FAMILY OÖCORITIDÆ.

Genus OÖCORYS FISCHER.

Section OÖCORYS s. s.

Oöcorys sulcata Fischer.

Section? BENTHODOLIUM Dall.

Oöcorys abyssorum (V. & S.) Dall.*

FAMILY ———?

Genus DALIUM DALL.

Dalium solidum Dall.

FAMILY CASSIDIDÆ.

Genus CASSIS LAMARCK.

Cassis inflata Shaw.

Genus GALEODEA LINK.

Galeodea Coronadoi Crosse.*

Genus LAMBIDIUM LINK.

Lambidium oniscus Linné.*

Genus ONISCIDIA SWAINSON.

Oniscidia Dennisoni Reeve.*

Genus SCONSIA GRAY.

Sconsia striata Lamarck.*

FAMILY DOLIIDÆ.

Genus DOLIUM LAMARCK.

Subgenus EUDOLIUM DALL.

Eudolium Crosseanum Monterosato.
Eudolium Verrillii Dall.*

FAMILY AMPHIPERASIDÆ.

Genus AMPHIPERAS GRONOVIUS.

Subgenus SIMNIA RISSO.

Simnia acicularis Lamarck.
Simnia piragua Dall.*

Section NEOSIMNIA Fischer.

Simnia intermedia Sowerby.
Simnia uniplicata Sowerby.
Simnia aureocincta Dall.

Genus PEDICULARIA SWAINSON.

Pedicularia decussata Gould.

Family CYPRÆIDÆ.

Genus CYPRÆA Linné.

Cypræa cinerea Gmelin.

Genus TRIVIA Gray.

Trivia pediculus Linné.*
Trivia suffusa Gray.
Trivia subrostrata Gray.
Trivia nivea Gray.
Trivia candidula Gaskoin.
Trivia globosa Gray.
Trivia quadripunctata Gray var. *rotunda* Kiener.

Genus ERATO Risso.

Erato Maugeriæ Gray.*

Family TRIFORIDÆ.

Genus TRIFORIS Deshayes.

Section TRIFORIS s. s.

Triforis lilacina Dall.*

Section MASTONIA Hinds.

(Subsection A, apex acute.)

Triforis perversa Linné var. *nigrocinctum* Adams.
Triforis decorata Adams var. *olivacea* Dall.*

(Subsection B, apex mammillary.)

Triforis turristhomæ Orbigny.

Section INELLA Bayle.

Triforis longissima Dall.
Triforis triserialis Dall.
Triforis triserialis var. *aspera* Jeffreys.*
Triforis triserialis var. *intermedia* Dall.
Triforis sarissa Dall.
Triforis colon Dall.
Triforis Rushii Dall.*

Section SYCHAR Hinds.

Triforis samanæ Dall.*
Triforis bigemma Watson.

Triforis (bigemma var.?) **hircus** Dall.
Triforis abrupta Dall.
Triforis torticula Dall.
Triforis inflata Watson.
Triforis inflata var. *ibex* Dall.
Triforis inflata var. *filata* Dall.
Triforis cylindrella Dall.

FAMILY CERITHIOPSIDÆ.

Genus **SEILA** A. ADAMS.

Seila terebralis C. B. Adams.*

Genus **CERITHIOPSIS** FORBES & HANLEY.

Section EUMETA Mörch.

Cerithiopsis subulata Montagu.

Section CERITHIOPSIS s. s.

Cerithiopsis crystallina Dall.
Cerithiopsis Sigsbeana Dall.
Cerithiopsis matara Dall.
Cerithiopsis Martensii Dall.
Cerithiopsis acontium Dall.

Section METAXIA Monterosato.

Cerithiopsis metaxæ Della Chiaje.
Cerithiopsis metaxæ var. *tæniolata* Dall.*
Cerithiopsis abrupta Watson.

FAMILY CERITHIIDÆ.

Genus **BITTIUM** LEACH.

Bittium alternatum Say.

Section DIASTOMA Deshayes.

Bittium varium Pfeiffer.*

Genus **ALABA** A. ADAMS.

Alaba tervaricosa C. B. Adams.*
Alaba Adamsii Dall.*
Alaba cerithidioides Dall.*

FAMILY VERMETIDÆ.

Genus SILIQUARIA LAMARCK.

Siliquaria squamata Blainville.
Siliquaria modesta Dall.

Genus VERMICULARIA LAMARCK.

Vermicularia lumbricalis Linné.
Vermicularia ? nigricans Dall.

Genus VERMETUS (ADANSON) MÖRCH.

Section PETALOCONCHUS Lea.

Vermetus erectus Dall.

Genus BIVONIA GRAY.

Bivonia ? exserta Dall.

FAMILY TURRITELLIDÆ.

Genus TURRITELLA LAMARCK.

Section TORCULA Gray.

Turritella exoleta Linné.
Turritella acropora Dall.

Section HAUSTATOR Montfort.

Turritella imbricata Linné.*

FAMILY MATHILDIIDÆ.

Genus MATHILDA SEMPER.

Mathilda yucatecana Dall.
Mathilda (elegantissima var. ?) **barbadense** Dall.
Mathilda Rushii Dall.*
Mathilda scitula Dall.*

Subgenus GEGANIA JEFFREYS.

Gegania Jeffreysi Dall.*

FAMILY SEGUENZIIDÆ.

Genus SEGUENZIA JEFFREYS.

Seguenzia ionica Watson.
Seguenzia monocingulata Seguenza.

FAMILY TRICHOTROPIDÆ.

Genus TRICHOTROPIS SOWERBY.

Subgenus MESOSTOMA DESHAYES.

Mesostoma migrans Dall.

Genus ? DOLOPHANES GABB.

Dolophanes Gabbi Dall.
Dolophanes columbella Dall.

FAMILY FOSSARIDÆ.

Genus FOSSARUS PHILIPPI.

Subgenus GOTTOINA A. ADAMS.

Gottoina bella Dall.
Gottoina compacta Dall.

FAMILY SOLARIIDÆ.

Genus FLUXINA DALL.

Fluxina brunnea Dall.
Fluxina discula Dall.

Genus SOLARIUM LAMARCK.

Solarium granulatum Lamarck.
Solarium peracutum Dall.
Solarium Sigsbeei Dall.

Genus OMALAXIS DESHAYES.

Omalaxis nobilis Verrill.

FAMILY? ADEORBIDÆ.

Genus SEPARATISTA GRAY.

Section HALOCERAS Dall.

Separatista cingulata Verrill.*

Genus ADEORBIS WOOD.

Adeorbis supranitidus Wood.
Adeorbis supranitidus var. *Orbignyi* Fischer.

Subgenus CLATHRELLA RECLUZ.

Clathrella naticoides Dall.*

Family RISSOIDÆ.

Genus RISSOA Fréminville.

Rissoa precipitata Dall.
Rissoa acuticostata Dall.

Genus RISSOINA Orbigny.

Rissoina lævigata C. B. Adams.
Rissoina albida C. B. Adams.
Rissoina decussata Montagu.*
Rissoina Chesnelii Michaud.

Genus BENTHONELLA Dall.

Benthonella gaza Dall.*
Benthonella Fischeri Dall.*
Benthonella nisonis Dall.*

Family CALYPTRÆIDÆ.

Genus MITRULARIA Schumacher.

Mitrularia equestris Linné.

Genus CRUCIBULUM Schumacher.

Crucibulum auricula Gmelin.

Section DISPOTÆA Say.

Crucibulum striatum Say.

Genus CALYPTRÆA Lamarck.

Calyptræa Candeana Orbigny.

Genus CREPIDULA Lamarck.

Section JANACUS Mörch.

Crepidula protea Orbigny.

Section SANDALIUM Schumacher.

Crepidula aculeata Gmelin.

Family CAPULIDÆ.

Genus CAPULUS Montfort.

Section KREBSIA Mörch.

Capulus intortus Lamarck.

Section HYALORISIA Dall.

Capulus galea Dall.

FAMILY AMALTHEIDÆ.

Genus AMALTHEA Schumacher.

Amalthea benthophila Dall.

FAMILY XENOPHORIDÆ.

Genus XENOPHORA G. Fischer.

Section XENOPHORA s. s.

Xenophora conchyliophora Born.

Section TUGURIUM P. Fischer.

Xenophora caribæa Petit.

FAMILY NATICIDÆ.

Genus NATICA Lamarck.

Section COCHLIS Mörch.

Natica maroccana Dillwyn.*
Natica livida Pfr.

Section NATICA s. s.

Natica canrena Lamarck.*
Natica castrensis Dall.
Natica perlineata Dall.

Subgenus NEVERITA Risso.

Section PAYRAUDEAUTIA B. D. & D.

Neverita nubila Dall.

Subgenus LUNATIA Gray.

Lunatia tenuis Recluz.
Lunatia leptalea Watson.
Lunatia fringilla Dall.
Lunatia fringilla var. *perla* Dall.

Subgenus POLYNICES Montfort.

Polynices uberina Orbigny.

Genus SIGARETUS Lamarck.

Sigaretus minor Dall.

Subgenus EUNATICINA Fischer.

Eunaticina carolinensis Dall.*

Genus GYRODES Conrad.

Gyrodes depressa Seguenza.*

FAMILY LAMELLARIIDÆ.

Genus LAMELLARIA MONTAGU.

Lamellaria Rangii Bergh.*

Super-Family PTENOGLOSSA.

FAMILY SCALIDÆ.

Genus SCALA (HUMPHREY) AUCTORUM.

Scala lineata Say.*
Scala Sayana Dall.*
Scala costulata Mighels.*
Scala multistriata Say.*
Scala scipio Dall.*
Scala apiculata Dall.*
Scala modesta C. B. Adams.*
Scala permodesta Dall.*
Scala clathrus Linné.*
Scala babylonia Dall.*
Scala retifera Dall.*
Scala Frielei Dall.*
Scala Rushii Dall.*
Scala Rushii var. *stylina* Dall.*
Scala sericifila Dall.*
Scala nitidella Dall.*
Scala muscapedia Dall.*
Scala eburnea Potiez & Michaud.*
Scala Dalliana Verrill & Smith.*
Scala Dunkeriana Dall.*
Scala pernobilis Fischer & Bernardi.
Scala belaurita Dall.
Scala centiquadra Mörch.
Scala Pourtalesii Verrill & Smith.
Scala Krebsii Mörch.
Scala contorquata Dall.
Scala uncinaticosta Orbigny.
Scala polacia Dall.
Scala formosissima Jeffreys.
Scala hellenica Jeffreys.
Scala hellenica var. *pumilio* Mörch.
Scala hellenica var. *scæva* Mörch.
Scala hellenica var. *nodosocarinata* Dall.
Scala hellenica var. *Leeana* Verrill.

Scala hellenica var. *Morchiana* Dall.
Scala hellenica var. *bicarinata* Sowerby.
Scala aurifila Dall.
Scala concava Dall.
Scala discobolaria Dall.

Genus ACLIS Lovèn.

Aclis lata Dall.
Aclis egregia Dall.
Aclis nucleata Dall.

Super-Family GYMNOGLOSSA.

Family EULIMIDÆ.

Genus EULIMA Risso.

Section EULIMA s. s.

Eulima intermedia Cantraine.
Eulima jamaicensis C. B. Adams.

Section MELANELLA Bowdich.

Eulima arcuata C. B. Adams.
Eulima elongata Dautzenberg.

Subgenus LEIOSTRACA H. & A. Adams.

Leiostraca acuta Sowerby.
Leiostraca fusus Dall.

Genus NISO Risso.

Niso splendidula Sowerby.*
Niso interrupta Sowerby.*
Niso interrupta var. *albida* Dall.
Niso interrupta var. *tricolor* Dall.
Niso interrupta var. *ægleës* Bush.*
Niso interrupta var. *circinata* Dall.
Niso Willcoxiana Dall.*

Family PYRAMIDELLIDÆ.

Genus PYRAMIDELLA Lamarck.

Section LONCHÆUS Mörch.

Pyramidella crenulata Holmes.*
Pyramidella candida Mörch.
Pyramidella auricoma Dall.*

Section PHARCIDELLA Dall.

Pyramidella Folinii Dall.

Section TIBERIA Jeffreys.

Pyramidella nitidula A. Adams.

Section PYRAMIDELLA s. s.

Pyramidella dolabrata Linné.

Genus TURBONILLA Risso.

Turbonilla belotheca Dall.
Turbonilla flavocincta C. B. Adams.
Turbonilla interrupta Totten var. *fulvocincta* Jeffreys.
Turbonilla curta Dall.
Turbonilla pusilla C. B. Adams.

Subgenus EULIMELLA Forbes.

Eulimella unifasciata Forbes.

Section STYLOPSIS A. Adams.

Eulimella resticula Dall.*

Subgenus CARELIOPSIS Mörch.

Careliopsis styliformis Mörch.*

Genus SYRNOLA A. Adams.

Subgenus OSCILLA A. Adams.

Oscilla nivea Mörch.*

? Genus PERISTICHIA Dall.

Peristichia toreta Dall.*
Peristichia agria Dall.*

Order SCUTIBRANCHIATA.

Sub-Order RHIPHIDOGLOSSA.

Super-Family SCHISMATOBRANCHIA.

Family SCUTELLINIDÆ.

Genus SCUTELLINA Gray.

Scutellina antillarum Shuttleworth.*

FAMILY ADDISONIIDÆ.

Genus ADDISONIA DALL.

Addisonia lateralis Requien var. *paradoxa* Dall.*

FAMILY COCCULINIDÆ.

Genus COCCULINA DALL.

Section COCCULINA DALL s. s.

Cocculina Rathbuni Dall.
Cocculina Beanii Dall.

Section COCCOPYGIA DALL.

Cocculina spinigera Jeffreys.*

FAMILY PHASIANELLIDÆ.

Genus PHASIANELLA LAMARCK.

Section EUCOSMIA CARPENTER.

Phasianella brevis Orbigny.

FAMILY TURBINIDÆ.

Genus LEPTOTHYRA CARPENTER.

Leptothyra induta Watson.
Leptothyra induta var. *tincta* Dall.
Leptothyra induta var. *insculpta* Dall.
Leptothyra induta var. *albida* Dall.
Leptothyra Philipiana Dall.
Leptothyra Linnei Dall.
Leptothyra Linnei var. *limata* Dall.

FAMILY TROCHIDÆ.

Genus GAZA WATSON.

Gaza superba Dall.
Gaza Fischeri Dall.

Subgenus CALLOGAZA DALL.

Callogaza Watsoni Dall.

Subgenus MICROGAZA DALL.

Microgaza rotella Dall.

Genus UMBONIUM Link.

Umbonium Bairdii Dall.

Genus TEINOSTOMA Adams.

Subgenus ETHALIA H. & A. Adams.

Ethalia reclusa Dall.
Ethalia suppressa Dall.*
Ethalia solida Dall.

Subgenus DILLWYNELLA Dall.

Dillwynella modesta Dall.

? Subgenus COCHLIOLEPIS Stimpson.

Cochliolepis parasitica Stimpson.*
Cochliolepis striata Dall.*

Genus CALLIOSTOMA Swainson.

Section CALLIOSTOMA s. s.

Calliostoma euglyptum Adams.
Calliostoma Bairdii Verrill & Smith.
Calliostoma Bairdii var. *Psyche* Dall.
Calliostoma circumcinctum Dall.
Calliostoma echinatum Dall.
Calliostoma sapidum Dall.
Calliostoma tiara Watson.
Calliostoma corbis Dall.
Calliostoma roseolum Dall.
Calliostoma apicinum Dall.
Calliostoma aurora Dall.
Calliostoma orion Dall.

Section EUCASTA Dall.

Calliostoma indiana Dall.

Section EUTROCHUS A. Adams.

Calliostoma jujubinum Gmelin.
Calliostoma jujubinum var. *tampaënsis* Conrad.
Calliostoma jujubinum var. *Rawsoni* Dall.*
Calliostoma yucatecanum Dall.
Calliostoma Sayanum Dall.*
Calliostoma Benedicti Dall.*
Calliostoma cinctellum Dall.
Calliostoma asperrimum Dall.
Calliostoma asperrimum var. *dentiferum* Dall.
Calliostoma asperrimum var. *serifilatum* Dall.

Genus MARGARITA Leach.

Section MARGARITA s. s.

Margarita erythrocoma Dall.
Margarita erythrocoma var. *samanæ* Dall.*

Section TURCICULA Dall.

Margarita imperialis Dall.

Section BATHYMOPHILA Dall.

Margarita euspira Dall.

Subgenus SOLARIELLA A. Adams.

Solariella amabilis Jeffreys.
Solariella lamellosa Verrill & Smith.
Solariella scabriuscula Dall.
Solariella ægleis Watson.
Solariella ægleis var. *lata* Dall.
Solariella ægleis var. *rhina* Watson.
Solariella ægleis var. *clavata* Watson.
Solariella infundibulum Watson.
Solariella Ottoi Philippi.
Solariella lissocona Dall.
Solariella lacunella Dall.
Solariella lacunella var. *depressa* Dall.
Solariella iris Dall.
Solariella lubrica Dall.
Solariella lubrica var. *iridea* Dall.*

Genus EUCHELUS Philippi.

Euchelus guttarosea Dall.

Genus BASILISSA Watson.

Section BASILISSA s. s.

Basilissa alta Watson.
Basilissa alta var. *delicatula* Dall.

? Section ANCISTROBASIS Dall.

Basilissa costulata Watson.

Family DELPHINULIDÆ.

Genus LIOTIA Gray.

Section ARENE H. & A. Adams.

Liotia Briareus Dall.
Liotia Briareus var. *perforata* Dall.

Liotia Briareus var. *aspina* Dall.
Liotia Bairdii Dall.
Liotia Bairdii var. *trullata* Dall.
Liotia tricarinata Stearns.
Liotia miniata Dall.
Liotia variabilis Dall.

Subgenus LIPPISTES Montfort.

Lippistes acrilla Dall.*
Lippistes amabilis Dall.

Family CYCLOSTREMATIDÆ.

Genus VITRINELLA C. B. Adams.

Vitrinella Holmesii Dall.*
Vitrinella multicarinata Dall.*

Genus CYCLOSTREMA Marryat.

Cyclostrema turbinum Dall.
Cyclostrema pompholyx Dall.
Cyclostrema cistronium Dall.*
Cyclostrema granulum Dall.*

Section GRANIGYRA Dall.

Cyclostrema limatum Dall.

Super-Family DICRANOBRANCHIA.

Family HALIOTIDÆ.

Genus HALIOTIS Linné.

Haliotis Pourtalesii Dall.

Family SCISSURELLIDÆ.

Genus SCISSURELLA Orbigny.

Section SCHIZOTROCHUS Monterosato.

Scissurella crispata Fleming.*

Section SCISSURELLA s. s.

Scissurella alta Watson.

FAMILY PLEUROTOMARIIDÆ.

Genus PLEUROTOMARIA J. SOWERBY.

Section PEROTROCHUS FISCHER.

Pleurotomaria Quoyana Fischer & Bernardi.

Section ENTEMNOTROCHUS FISCHER.

Pleurotomaria Adansoniana Crosse & Fischer.

FAMILY FISSURELLIDÆ.

Genus PUNCTURELLA LOWE.

Subgenus PUNCTURELLA s. s.

Puncturella circularis Dall.
Puncturella trifolium Dall.
Puncturella Watsoni Dall.

Subgenus FISSURISEPTA SEGUENZA.

Fissurisepta triangulata Dall.*

Subgenus CRANOPSIS A. ADAMS.

Cranopsis asturiana Fischer.
Cranopsis? erecta Dall.*

Genus EMARGINULA LAMARCK.

Subgenus RIMULA DEFRANCE.

Rimula frenulata Dall.*

Subgenus EMARGINULA s. s.

Emarginula cancellata Philippi.
Emarginula compressa Cantraine.

Subgenus SUBEMARGINULA BLAINVILLE.

Subemarginula octoradiata Gmelin.

Genus FISSURELLA BRUGIÈRE.

Section CREMIDES H. & A. ADAMS.

Fissurella alternata Say.

Subgenus GLYPHIS CARPENTER.

Glyphis fluviana Dall.

Genus FISSURELLIDEA ORBIGNY.

Fissurellidea limatula Reeve.

Suborder DOCOGLOSSA.

Super-Family PROTEOBRANCHIA.

Family ACMÆIDÆ.

Genus PECTINODONTA Dall.

Pectinodonta arcuata Dall.

Super-Family ABRANCHIA.

Family ——— ?

Genus PROPILIDIUM Forbes & Hanley.

Propilidium ancyloide Forbes & Hanley.*

Genus LEPETELLA Verrill.

Lepetella tubicola Verrill.*

Subclass ISOPLEURA.

Super-Order POLYCONCHÆ.

Order POLYPLACOPHORA.

Suborder CHITONACEA.

Super-Family EOCHITONIA.

Family LEPTOCHITONIDÆ.

Genus LEPTOCHITON Gray.

Leptochiton pergranatus Dall.

Genus HANLEYIA Gray.

Hanleyia tropicalis Dall.

Family ISCHNOCHITONIDÆ.

Genus ISCHNOCHITON (Gray) Carpenter.

Section STENOPLAX Carpenter.

Ischnochiton limaciformis Sowerby.

Super-Family OPSICHITONIA.

FAMILY MOPALIIDÆ.

Genus NOTOPLAX H. ADAMS.

Notoplax floridanus Dall.

CLASS SCAPHOPODA.

Order SOLENOCONCHA.

FAMILY DENTALIIDÆ.

Genus DENTALIUM LINNÉ.

Dentalium agile M. Sars.
Dentalium perlongum Dall.
Dentalium filum Sowerby.*
Dentalium callipeplum Dall.
Dentalium matara Dall.*
Dentalium leptum Bush.*
Dentalium antillarum Orbigny.
Dentalium calamus Dall.*
Dentalium taphrium Dall.*
Dentalium candidum Jeffreys.*
Dentalium sericatum Dall.
Dentalium carduus Dall.
Dentalium disparile Orbigny.
Dentalium ceratum Dall.
Dentalium Gouldii Dall.
Dentalium ceras Watson.
Dentalium capillosum Jeffreys.
Dentalium laqueatum Verrill.
Dentalium compressum Watson.
Dentalium ophiodon Dall.
Dentalium callithrix Dall.
Dentalium ensiculus Jeffreys.

Genus CADULUS PHILIPPI.

Cadulus quadridentatus Dall.
Cadulus æqualis Dall.
Cadulus spectabilis Verrill.
Cadulus Watsoni Dall.
Cadulus poculum Dall.
Cadulus Jeffreysi Monterosato.

Cadulus carolinensis Bush.
Cadulus Bushii Dall.
Cadulus Agassizii Dall.
Cadulus lunula Dall.
Cadulus obesus Watson.
Cadulus amiantus Dall.
Cadulus cucurbita Dall.
Cadulus acus Dall.*
Cadulus minusculus Dall.*

This list contains about four hundred and seventy species and varieties collected by the "Blake," to which may be added those enumerated in Part I, making a total of about seven hundred species, with which, in both papers, between two and three hundred related forms are compared or differentiated, making a total of nearly one thousand species, more or less fully discussed in this Report. Of those in Part I, eighty-one species, seven varieties, and twelve groups of higher value were regarded as new. In the present paper three hundred and eighty-five species and varieties, and thirty higher divisions, are treated as new, making a total for this Report of four hundred and seventy-three species and varieties, and forty-two genera, subgenera, or sections discriminated for the first time among the Brachiopods, Pelecypods, Gastropods, and Scaphopods collected by the Blake, or illustrating the fauna investigated in the work of the Blake. In addition to these, there are about twenty species of Nudibranchs in the hands of Dr. R. Bergh, of Copenhagen, to be reported upon; the Pteropods and other floating pelagic forms have not been studied, while the report by Professor Verrill on the Cephalopods has been some time published, and includes some ten or twelve species.

The magnitude of this contribution to our knowledge of the Mollusks of the region, due to the exertions of Professor Agassiz, Pourtalès, Sigsbee, Bartlett, and their co-workers, is very evident. But the writer may fairly add that the value of the work consists not merely in having added nearly five hundred new forms to the known fauna, and materially enlarging our list of genera; but, to an equal or greater extent, in the knowledge gained of the organization and structure of some of the most interesting Mollusks known. There is in this Report material enough to reward the attention of naturalists, both of the systematic and the purely morphologic schools, to whose appreciative and impartial criticism it is respectfully offered by the writer.

CLASS GASTROPODA.

SUBCLASS ANISOPLEURA.

Order OPISTHOBRANCHIATA.

Suborder TECTIBRANCHIATA.

FAMILY ACTÆONIDÆ.

Genus ACTÆON MONTFORT.

Subgenus ACTÆON s. s.

Shells rather thin, with a single plait on the columella, which passes continuously into the anterior margin of the peristome. Type *A. tornatilis* Linné.

Actæon exilis JEFFREYS.

Actæon exilis Jeffreys, Ann. Mag. Nat. Hist., 4th ser., VI. p. 85, 1870. Watson, Chall. Rep. Gastr., p. 624, 1886.
Auriculina insculpta Verr., Proc. U. S. Nat. Mus., III. p. 381, 1880.
Actæon nitidus Verrill, Trans. Conn. Acad., V. p. 540, pl. lviii. fig. 21, July, 1882.
? *Actæon exilis* Seguenza, Form. Terz. Calabria, p. 251.

Habitat. Off east coast of Florida, 150–200 fms., Dr. Rush; Campeche Bank, Gulf of Mexico, in 200 fms., Dr. Rush; off Martha's Vineyard in 312–487 fms., U. S. Fish Commission; North Atlantic, Jeffreys, 227–1456 fms.

The Calabrian fossils in the Jeffreys collection seem to be more inflated anteriorly than the recent shells.

Actæon pusillus (FORBES) JEFFREYS.

Tornatella pusilla Forbes, Ægean Rep., p. 191, 1843.
Actæon pusillus Jeffreys, Ann. Mag. Nat. Hist., 4th ser., VI. p. 84, 1870. Watson, Chall. Gastr., p. 627, 1886.

Habitat. Off Havana, Sigsbee, in 450 fms. Off Sand Key at Station 9, in 111 fms., bottom temperature 55°.5 F.

The description of Forbes is too vague, and being without a figure the species may be regarded as rehabilitated by Jeffreys. The latter considers it identical with the *A. depressus* of Libassi, which is unknown to me, and with the *A. noæ* J. Sowerby, from the Red Crag of Britain, an opinion which I cannot confirm after careful comparison of specimens. The *A. noæ* is a very ponderous and much larger species, with a much more prominent and horizontal fold on the columella, as well as a thickened and striated outer lip.

Actæon punctostriatus Adams.

Tornatella punctostriata C. B. Adams, Bost. Journ. Nat. Hist., III. p. 323, pl. iii. fig. 9, 1840. Gould, Inv. Mass., p. 245, fig. 188, 1841.

Actæon punctostriatus Stimpson, Shells of New England, p. 51, 1851.

Actæon cubensis Gabb, Top. Geol. San. Domingo, p. 245, 1873. Mörch, Malak. Blätt., XXII. p. 170, 1875.

Tornatella punctata Orbigny, Moll. Cuba, I. p. 230, pl. xvii. figs. 10–12, 1842. (Not of Lea or Piétte.)

Habitat. Buzzard's Bay, Mass., to Florida, Cuba, and Santo Domingo, in 2–63 fms. Pliocene of Florida. Orbigny's name is preoccupied by Lea for a fossil species (1833), but there is practically no doubt that his shell and Adams's are identical. They vary from pure white to trifasciate with rose or livid brown, usually faint and nebulous. The height of the spire, elevation of the nucleus, and extent of shell covered by the punctate lines, vary in the different specimens. Usually the spire is rather elevated, the nucleus somewhat depressed, and the punctate grooves cover about half of the last whorl. There may be one or several subsutural lines, the middle of the whorl is generally smooth and free from lines, and the anterior part crowded. The northern ones are variegated like those from the Antilles, but the latter are more frequently bright colored. The very young, like those figured by Adams and Orbigny, are usually white or translucent. The colors, when banded, are nearly always rather nebulous, and the number of bands never exceeds three, the anterior one most often absent. The shell is always thin, and often nearly translucent. *Actæon turritus* Watson (Chall. Gastr., p. 628, pl. xlvii. fig. 1) should be compared with this species, though the figures are not very similar; the locality, Culebra Island, W. I., is suspicious.

Actæon Cumingii A. Adams.

Actæon Cumingii A. Adams, P. Z. S. 1854, p. 58. Mörch, Malak. Blätt., XXII. p. 169, 1875.

Tornatella Cumingii Reeve, Conch. Icon. *Tornatella*, fig. 12, 1865.

Tornatella textilis Guppy, Geol. Mag., 1874, p. 407, pl. xvi. fig. 4.

Habitat. Rio Janeiro, Capt. Martin; Porto Rico, Krebs; five miles off Cape Florida in eight fathoms, Dr. Rush.

This differs from *A. delicatus* by its stumpier form, coarser and ruder subcancellate striation, more prominent fold on the columella, and particularly by its nucleus which, though small, is swollen and set on the peak of a very acute spire like a swollen terminal bud on a twig. In *delicatus* the nucleus, instead of appearing larger, is considerably smaller than the whorl in front of it, in which it is also partially immersed.

Actæon delicatus n. s.

Plate XVII. Fig. 5.

Actæon fasciatus? Dall, Bulletin M. C. Z., IX. p. 94, 1881, not of Lamarck.

Shell ovate, white, or suffused with rose pink, not in bands but generally, or in longitudinal flammules, with usually a white margin in front of the suture; there are six or seven whorls, the last more than half the length of the shell, regularly rounded and grooved by, on the last whorl, 20–30 strong, rather deep, coarsely punctate grooves between rounded interspaces; lines of growth quite perceptible, suture somewhat appressed, not channelled; aperture more than half as long as the shell; outer lip thin, inner lip hardly callous, columella straight, without any chink behind it, and bearing a single moderate fold. Nucleus small, mostly immersed in the succeeding whorl, apex not acute, surface usually not polished but a little less coarsely sculptured than that of *A. Cumingii* Adams. Lon. of the largest specimen, 10.0; max. lat. 5.6; lon. of aperture, 6.0 mm.

Habitat. Station 19, 310 fms.; by Sigsbee, Station 50 (Lat. 26° 31′ and Lon. 85° 53′ W.), in 119 fms.; Station 290, off Barbados, in 73 fms., coral, bottom temperature 70°.75 F.; and Station 100, off Morro Light, Havana, in 250–400 fms.

The difference between the nucleus of this species and that of *A. Cumingii* is noted under the latter species. It is just possible that it is to the present species that is to be referred the single specimen obtained by Gabb, and which he referred to *A. tornatilis*. The latter is not known from this region.

Actæon melampoides Dall.

Plate XVII. Fig. 2.

Actæon melampoides Dall, Bull. M. C. Z., IX. p. 95, 1881.
? *Actæon hebes* Verrill, Trans. Conn. Acad., VI. p. 428, pl. xliv. fig. 15, 1885.

Habitat. Station 19, 310 fms., off Bahia Honda, Cuba, bottom temperature 52°.5 F. Station 2224 of the U. S. Fish Commission, in 2574 fms., off the east coast of the United States (Verrill).

I have not seen the typical specimen of *A. hebes*, but the figure and description agree so closely with *A. melampoides* that I have little doubt of their identity.

Only one specimen was obtained by the Blake.

Among Antillean shells I have seen nothing which I could identify with the *A. splendidulus* of Mörch from St. Thomas, or the biplicate Cuban *A. ovulum* Pfr. The last is only 1.6 mm. long, and may be an immature *Marginella*.

Actæon perforatus Dall.

Plate XVIII. Fig. 3.

Actæon perforatus Dall, Bull. M. C. Z., IX. p. 96, 1881.

Habitat. Station 2, 805 fms.

Only one specimen of this species has been received. It differs from *A. exiguus* Dkr. of the same region in its very much shorter spire and globular proportions, in its obsolete columellar fold, and the strength and uniformity of its punctate sulci.

Actæon Danaida Dall.

Plate XVII. Fig. 12.

Actæon Danaida Dall, Bull. M. C. Z., IX. p. 96, 1881.

Habitat. Station 43, 339 fms., off Tortugas, bottom temperature 45°.0 F. Only one specimen and a fragment were obtained.

Actæon incisus Dall.

Plate XVII. Figs. 1, 1 b.

Actæon incisus Dall, Bull. M. C. Z., IX. p. 95, 1881.

Habitat. Yucatan Strait, off Cape San Antonio, 640 fms.

In this, as in the preceding deep-water species, the fold or ridge on the columella is faint, though not entirely absent, and is best seen from the side; in fact, it is almost invisible in all, except *A. melampoides*, from in front as the figures on Plate XVII. are viewed. The columella in these figures, however, is drawn as straighter and broader than it really appears; but in these particulars it is very difficult to get a draughtsman who knows nothing of shells to catch the characteristic curves in every instance.

Genus OVULACTÆON Dall.

Shell cypræiform, involute; with an apical perforation, as in *Bulla;* columella simple, without plaits; margin of the aperture continuous, simple, thickened, the callus on the body elevated, parallel with the outer lip; aperture narrow, almost linear, slightly effuse at the extremities, as long as the shell. Type *O. Meekii* Dall.

This interesting form resembles an involute *Globiconcha** with perforate apex and thickened aperture, or a rounded *Actæonella* without plaits. In the unplicate series of the *Actæonidæ* it holds a place analogous to that of *Cypræactæon* White among the plicate forms.

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* The *G. ovula* Orbigny, which I have not seen, but which has been referred to as an immature *Cypræa*, may perhaps belong here.

Ovulactæon Meekii n. s.

Plate XXXIII. Figs. 3, 4.

Shell with the outline of a small *Cypræa* like *C. edentula*, widest in its posterior third, white, polished with fine, distinct, impressed incremental lines, and the faintest trace of spiral linear markings; a depressed line or sulcus indicates a previous resting stage half a whorl behind the present thickened aperture in the older specimen; in the younger, the varical sulcus is three quarters of a whorl behind the aperture. The apex in the older shell is perforate, the whorl rounding over to the perforation, and the spire invisible; in the younger specimen the perforation is proportionally wider, and about half a turn can be seen. The lines of growth become stronger and more regularly grooved as they pass over the summit into the pit. The aperture is very narrow, curved with the profile of the shell, and extending beyond the summit. Unlike *Cypræa*, the thickening of the outer lip is altogether internal, simple, and smooth; the callus opposite is narrow, with a sharply defined abrupt outer margin, and the inner margin raised sharply up parallel with the outer lip, with which it is continuous at the extremities; the flat part of the callus is widest anteriorly, polished but not smooth, but the raised edge is without teeth or transverse striation of any sort. The extremities of the aperture are elevated to follow the profile of the body of the shell. Lon. of largest specimen, 5.5; max. lat. 3.0 mm.

Habitat. Off Havana, Sigsbee, in 450 fms. West of North Bemini, Bahamas, in 200 fms., sand, Dr. Rush (U. S. Nat. Mus., No. 61228).

This extremely interesting shell is well shown by the figure. There can be little question as to its probable relations. The characters of the aperture are essentially different from anything among the *Cypræidæ*, and it has not the polished lacquer which species of that family owe to the expanded mantle-margin. Only one specimen was obtained at either locality.

Family RINGICULIDÆ.

Genus RINGICULA Deshayes.

Section RINGICULINA Monterosato.

Ringicula nitida Verrill.

Ringicula nitida Verrill, Am. Journ. Sci., 3d series, Vol. V. p. 16, Jan., 1873. (Extra copies sent out Dec. 13, 1872.) Dall, Bull. M. C. Z., IX. p. 97, 1881.

Ringicula leptocheila Brugnone, Misc. Malac., p. 18, fig. 11, 1873. Agassiz, Three Cruises of the Blake, II. p. 70, fig. 291, 1888.

? *Ringicula peracuta* Watson, Journ. Linn. Soc., XVII. p. 292, 1883. Chall. Gastr., p. 636, pl. xlvii. fig. 11, 1886.

Habitat. Fossil, Pliocene of Italy, Brugnone, and recent in the Mediterranean. Bed of the Gulf Stream, Pourtalès, in 447 fms. Yucatan Strait, 640 fms.

Station 43, off Tortugas, in 339 fms., bottom temperature 45°.0 F. Station 211, off Martinique, in 357 fms., sand. Station 264, off Grenada, in 416 fms., gray ooze, bottom temperature 42°.5 F. Atlantic sea-bed, Jeffreys. Off Bermuda, Culebra Island, West Indies, and Pernambuco, in 350 to 1075 fms., mud and ooze, bottom temperature 38°.2 F., Challenger Expedition.

I have satisfied myself by a comparison of authentic specimens that the species of Verrill and Brugnone are the same, the former name having priority. The locality, description, and figure of *R. peracuta* agree well with some varieties of *R. nitida*, with which it does not seem to have been compared. The elevation and the extent of the spiral grooving differ in different individuals, as observed with species of *Actæon.*

Although fossil in the Italian Pliocene, this species has not yet been recorded from the so-called Pliocene of America.

The other species of this interesting group from this region are the recent *Ringicula semistriata* Orb., *R. tridentata* Guppy from the Miocene of Jamaica, and two forms from the Florida Pliocene. *R. tridentata* resembles *R. semistriata*, but wants the striations. The larger Florida species (*R. floridana* n. s.) is about 1.5 mm. wide and 2.5 mm. long, with five whorls. Its aperture is like that of *R. semistriata*, but the whole shell is covered with strong spiral grooving with rounded interspaces. There are 12–14 grooves on the last whorl. The Miocene *tridentata* is smooth and widest; the Pliocene *floridana* is narrower, and wholly striate; the recent *semistriata* is intermediate in width and half striate. The other form from the Caloosahatchie Pliocene is like *R. floridana*, except that it has a larger nucleus, four whorls, and is about 1.6 mm. long and 1.0 mm. wide. It may be a dwarf race of the other, and for the present will be referred to as *R. floridana* var. *Guppyi.*

FAMILY TORNATINIDÆ.

Genus TORNATINA A. ADAMS.

This group is credited by Fischer with three subgenera beside the typical one, for the first of which he adopts *Utriculus* Brown (non Schumacher) for species with an elevated spire, an unchannelled suture, and no plication on the columella; for the second, *Coleophysis* Fischer, with a truncate and concave apex, the shell attenuated behind with the columella plicate ; lastly, *Sao* H. & A. Adams, with the shell pyriform, greatly dilated in front, and the columella simple.

It is not clear to my mind that it would not be better to follow Adams in his original arrangement of the genus, and separate *Utriculus*, Brown, altogether from *Tornatina*, thus associating with the latter all the *Tornatinidæ* with a plicate columella, and with the former all those with a simple columella. Thus, for the region under consideration we should have the species arranged as follows : —

Genus **TORNATINA** A. ADAMS.

Spire elevated. Columella uniplicate.
T. bullata Kiener (= *canaliculata* Orb. non Say).
T. recta Orb. (+ *T. coix-lacryma* Guppy, Geol. Mag. 1867, p. 500).
T. canaliculata Say (non Orbigny).
T. Candei Orb. (? = *canaliculata* Say, var.).
T. spatha Watson.

Subgenus COLEOPHYSIS FISCHER.

Spire depressed. Columella uniplicate.
C. perplicatus Dall.

Subgenus CYLICHNELLA GABB.

Spire depressed. Columella biplicate.
C. bidentata Orb. (+ *biplicata* Lea).
C. oryza Totten.
C. ovum-lacerti Guppy (Trinidad Eocene).

Genus **UTRICULUS.**

Spire elevated or involute; shell subcylindrical; columella simple, uniplicate.
U. Gouldii Couthouy.
U. pertenuis Mighels.
U. Mayoi Dall.
U. Frielei Dall.
U. vortex Dall.
U. (*vortex* var. ?) *domitus* Dall.
U. pervius Dall.

Subgenus RETUSA (BROWN) MÖRCH.

Shell pyriform, transversely sulcate, spire depressed, concave.
R. sulcata Orbigny.
R. cœlata Bush.
R. omphalis Mörch.
R. ? *ovata* Jeffreys.

Subgenus COLEOPHYSIS FISCHER.

Coleophysis perplicatus DALL.

Shell ivory white with a very thin translucent epidermis, marked only with delicate lines of growth and a few faint incised spirals near the columella; anterior half of the shell wide and rounded, posterior half narrowing toward the apex with the sides somewhat compressed or flattened; outer lip thin, straight except in front where it expands a little before rounding to the rather thick twisted pillar; behind deeply notched and behind the notch arching over and turning forward to meet a carina which revolves about the apex; apex truncate, carinated by a line which forms the outer boundary of the path of the notch, within vorticiform, about one and a half whorls visible around the central perforation and descending into it; body with hardly any wash of callus; pillar strong, with a large horizontal fold and a minute chink behind it; aperture as long as the shell, straight and narrow behind, wide and somewhat oblique in front; max. lon. of shell, 5.0; max. lat. 3.0; lat. of apex, 1.75 mm.

Habitat. Station 20, off Bahia Honda, Cuba, in 220 fms., bottom temperature 62°.0. Barbados, 100 fms.

It is difficult, or rather impossible, to determine the generic place of these small Tectibranchs without a knowledge of the soft parts. They are referable to *Coleophysis*, *Cylichna*, or *Diaphana*, or even *Sao*, at the option of the describer, guided only by the characters of the shell. The presence of the plait would indicate the first-mentioned section for the present species. It is perhaps nearest in general form to the *Cylichna ovata* of Jeffreys, or *Diaphana gemma* of Verrill, which has no plait and is much more attenuated behind.

Subgenus CYLICHNELLA Gabb.

Cylichnella bidentata Orbigny.

Bulla bidentata Orbigny, Moll. Cuba, I. p. 125, pl. iv. figs. 13–16, 1841.
Bulla biplicata Lea, Proc. Bost. Soc. Nat. Hist., I. p. 204, 1844; Journ. Nat. Hist., V. p. 286, pl. xxvi. fig. 2, 1847.
Utriculus biplicatus Tryon, Am. Mar. Conch., p. 104, pl. xiii. fig. 213, 1873.
Cylichnella bidentata Gabb, Proc. Phila. Acad. Nat. Sci., p. 273, pl. x. fig. 2, 1872. Geol. San. Domingo, p. 246, 1873. Mörch, Malak. Blätt., XXII. p. 171, 1875.
Cylichna biplicata Bush, Hatteras Moll., Trans. Conn. Acad., VI. p. 467, pl. xlv. fig. 14, 1885.

Habitat. From Hatteras to Santo Domingo in 7–168 fms., and from Florida to Texas near low-water mark. Barbados, 100 fms.

Miss Bush may have been right in referring this to *Cylichna*, which it much resembles, but I cannot help thinking it should be placed in this family. *Cylichna oryza* Totten belongs in the same subgenus, but is more inflated and larger. This is not the *Cylichna biplicata* Adams described in 1850 from the Chinese Seas.

Genus UTRICULUS (Brown) Adams.

Utriculus Mayoi Dall.

Shell solid, white, with a yellowish polished epidermis and well marked lines of growth, spiral striæ very faint and few, or none; whorls 3½–4, spire distinct, little elevated, nucleus small, rounded, not prominent; aperture long, rather wide and straight, the posterior commissure rounded, the anterior wide, the margin spirally curved showing the axis (though this is not pervious); umbilical chink none, pillar broad, white, oblique without any trace of a plication; outer lip thin, arched forward in the middle; suture very deep; inner lip with a wash of callus. Lon. of shell, 8.3; of aperture, 7.0; max. lat. 4.6 mm.

Habitat. Fish stomach, at Portland, Maine, from which it was collected by Mr. Mayo and sent to Dr. Jeffreys. This shell recalls *Bulla turrita* Möller (Adams, Thesaurus Conch., pl. cxxi. fig. 28, but is much larger, with proportionately shorter spire, straighter sides, and more width anteriorly).

Utriculus ? Frielei Dall.

Plate XVII. fig. 4.

Utriculus ? Frielei Dall, Bulletin M. C. Z., IX. p. 101, 1881.

Habitat. Off Cape San Antonio, Yucatan Strait, 640 fms.

Utriculus leucus Watson seems to approach this species as nearly as any known form, but has sundry distinctive characters. There is no doubt, however, that there are differences of form and development of the tip of the spire, in these enrolled forms, in adult individuals, as well as during the stages of one individual. It will not do, therefore, to draw the specific lines too taut on this sort of character.

Utriculus ? vortex Dall.

Plate XVII. fig. 3.

Utriculus ? vortex Dall, Bulletin M. C. Z., IX. p. 100, 1881.
Cylichna Dalli Verrill, Trans. Conn. Acad., V. p. 542, 1882; VI. p. 274, pl. xxix. fig. 15, 1884.

Habitat. Station 43, 339 fms.; Station 44, 539 fms.

This species differs remarkably from the form about to be described. With the material I have to study, I am obliged to separate them. But in the few specimens I have seen there is a good deal of variability indicated.

Cylichna Dalli, I am sorry to say, agrees perfectly with *U. ? vortex* and I feel there are no grounds upon which I could attempt a rescue of its specific validity. I have compared authentic specimens.

Utriculus (vortex var. ?) domitus n. s.

Plate XVII. Fig. 8.

Shell solid, yellowish white, short, broad and squarely truncate in front with a rather blunt mammiform spire exhibiting about three turns; surface transversely marked with faint lines of growth, and near the suture with fine well-marked wrinkles as if too large for the spire around which the posterior fourth of the whorl is closely wound and very strongly appressed, giving the posterior edge of the last whorl especially a bevelled appearance; spiral sculpture, extremely fine grooves, not puncticulate, strong on the posterior aspect, obsolete on the body (which appears polished), and, except in the young, on the anterior extreme; the sutural wrinkles are prettily shagreened by the intersection of these fine close grooves; spire very obliquely wound, the margin of the volutions rounded (notwithstanding its being closely appressed), and the rounded edge often eroded showing the inner porcellanous under the outer more cretaceous layer, the extreme apex eroded in all the specimens obtained; aperture very wide in front, extremely narrow behind; the margin retreating from the columella to half-way between axis and exterior, almost straight in front, then rising and continuing backward nearly parallel to the axis, and falling away again obliquely to the suture, forming an extremely narrow and deep notch; body with a thin deposit of white callus, columella hardly thickened, spiral, passing without noticeable interruption into the anterior margin; outer lip sharp, thin. Lon. of shell, 9.0; of aperture, 7.5; max. lat. of shell, 5.25; of aperture, 3.37 mm.

Station 236, off Bequia, in 1591 fms., ooze, bottom temperature, 39°.0; Station 162, off Guadelupe, in 734 fms., ooze, bottom temperature 40°.0 F.

This shell has a distant resemblance to an *Actæon*, which it is not, as is evident on inspection. It may prove a *Cylichna* when the soft parts are known, reference until then being necessarily provisional. It is peculiarly bevelled off behind and abrupt in front, and is stouter than most shells of this group. It is posssble that in the young at some stage the nucleus may be entirely enrolled. It is quite distinct from anything recent or fossil which I find figured. It is most nearly allied to *U.? vortex* Dall, which is a smaller, proportionally more slender, cylindrical shell, with somewhat different sculpture and a blunter spire. In the figure of *U.? domitus* the wrinkles on the spire are not sufficiently emphasized as compared with the lines of growth, nor is the difference in sculpture between the body and the posterior aspect as sharply defined as it appears under a good lens. This species differs from *Utriculus spatha* Watson in form and in the absence of folds on the columella. It differs from *U. oliviformis* Watson in the proportion of the spire to the whole length, in the unequal distribution and different character of the sculpture. But I doubt if these species do not vary greatly, and the discovery of intermediate links between them and *U. vortex* would not surprise me in the least.

Utriculus pervius Dall.

Shell short, stout, truncate apically, white, polished, sculptured only with faint incremental lines; form subcylindrical, larger anteriorly, a little compressed just behind the middle; aperture long, narrow behind and rounded at the posterior commissure, where it has a shallow rounded notch, the outer boundary of whose path is marked on the summit by a raised line; anterior part of aperture wider, not very oblique, rounded in front; outer lip straight, thin, arched forward in the middle; pillar thin, simple, with no trace of a plait; body without perceptible callus; behind the pillar a small, very deep umbilical perforation; apex nearly flat, bounded by the above-mentioned raised line, within which the fasciole of the notch is rounded over but does not reach the level of the line referred to; nucleus somewhat depressed, but not deeply; about three and a half whorls are visible on the apex. Max. lon. of shell, 4.0; max. lat. of do., 2.5; lat. of apex, 1.5 mm.

Habitat. West Indies, U. S. Fish Commission, probably from near Barbados, in about 80 fms., sand.

This species is remarkable for its deep though minute umbilicus and its dish-like apex. Its general form is not unlike *U. perplicatus*, but the sides are straighter and the other characters quite different. The locality is unfortunately doubtful, though it was somewhere in the Antilles.

Subgenus RETUSA (Brown) Mörch.

Retusa ? ovata Jeffreys.

Cylichna ovata Jeffreys, Rep. Brit. Assoc., 1870, Porc. Exp., p. 156. Ann. Mag. Nat. Hist., 5th ser., X. p. 34, 1882. Watson, Chall. Rep., p. 664, pl. xlix. fig. 9, 1885.

Utriculus conulus G. O. Sars, Moll. Reg. Arct. Norv., p. 287, pl. 17, fig. 17, 1878.

Cylichna umbilicata var. *conulus* Jeffr., Brit. Conch., IV. p. 414; V. p. 223.

Not *Bulla conulus* Deshayes, *Cylichna conulus* of Weinkauff, or *Bulla conulus* of Searles Wood.

Habitat. North Atlantic, Porcupine and Triton Expeditions; Bay of Biscay, Travailleur Expedition; Azores, Josephine, Porcupine, and Challenger Expeditions; West Indies, off Culebra Island, Challenger Expedition; off Pernambuco, Challenger Expedition; Straits of Florida, 150–465 fms., Dr. Rush; east coast of North America, 124–400 fms., U. S. Fish Commission. Range 100–1000 fms. over a muddy bottom in all parts of the North Atlantic, with temperatures from 40°.0 to 62°.0 F.

Retusa ? obesiuscula Brugnone.

Cylichna obesiuscula Brugnone, Bull. Soc. Mal. Ital., III. p. 39, pl. i. fig. 7, 1877.

Diaphana conulus Verrill, Proc. U. S. Nat. Mus., III. p. 382, 1880; Trans. Conn. Acad., V. p. 543, pl. lviii. fig. 25, 1882; VI. p. 273, 1884.

Habitat. Pliocene of Messina, Seguenza; of Palermo, Brugnone. U. S. Fish Commission Stations 870, 949, 2595, 2602, and 2614, in 63–168 fms., living in about 100 fms., temperature 61° F., over a sandy bottom.

This species is quite distinct from *Bulla conica* or *conulus* of Deshayes, Wood, Sars, etc., from *C. Hœrnesi* and *C. ovata*, with all of which it has been confounded by various authors, especially Jeffreys. Professor Verrill in referring to it noted the discrepancies.

In the absence of the soft parts, which have not been preserved, it is impossible to fix the place of this and the preceding species. If they belong to the *Tornatinidæ*, they would be included with *Retusa* as I have used it. If to the *Scaphandridæ*, they would find a place in Monterosato's section *Cylichnina*. Further knowledge is required before a satisfactory answer can be given to this and many other doubtful questions.

The specimens have been compared with Brugnone's types in the Jeffreys collection, and with authentic specimens of the other forms mentioned. The genuine *C. conulus* seems to have a very wide range, and was dredged by Captain St. John, R. N., in Korea. The specimens in the Jeffreys collection from the Italian Pliocene collected by Seguenza, and named *conulus* or *ovata*, were of this species. The other *conulus* appeared from the Tertiaries of France, Belgium, and Great Britain.

Genus VOLVULA A. Adams.

Volvula acuta Orbigny.

Volvula recta Mörch, non Orbigny, Malak. Blätt., XXII. p. 179.
Bulla acuta Orbigny, Moll. Cuba, I. p. 126, pl. iv. figs. 17–20, 1841.
? *Volvula minuta* Bush, Trans. Conn. Acad., VI. p. 469, pl. xlv. fig. 11, 1885.

Habitat. Barbados, 100 fms. Off Hatteras, 15–124 fms., U. S. Fish Commission.

This species, when young, seems to me indistinguishable from *V. minuta* Bush, so far as the shells are concerned. I have not seen the soft parts. Northern specimens are a little yellower and more earthy than those from the Antilles, as in the case of many other species having a wide geographical range. Miss Bush's figure is more ovate than that of Orbigny, and I find specimens agreeing with both figures in form, with others which appear more or less intermediate. This species differs from *V. acuminata* Brug. in being one quarter shorter with the same width, in having a well-marked umbilical chink, and an apical process averaging shorter in specimens of the same size.

Volvula oxytata Bush.

Volvula oxytata Bush, Trans. Conn. Acad., VI. p. 468, pl. xlv. fig. 12, 1885.
? *Volvula persimilis* Mörch, Malak. Blätt., XXII. p. 179, 1875.
? *Bulla fucicola* (Chiereghini) fide Nardo, Sinon., Veneto, 1847; Brusina, Contr. p. Fauna Dalm., p. 83, 1866.
Volvula acuminata (Brug.) Auct. *ex parte.*

Habitat. Mediterranean, Jeffr. Coll. East coast of the United States, between Hatteras and Cuba, 5–63 fms., U. S. Fish Commission. Antilles, Krebs.

In examining the Jeffreys collection I find this species represented from the Mediterranean from various collectors, and from Adventure Bank, Porcupine

Expedition. The British and all the northern specimens, and one Mediterranean lot, are of another species, shorter and stouter, which I take to be the genuine *acuminata* of Brugière. It in its turn differs somewhat from the Crag fossil which has been called by the same name, but perhaps not specifically. I have not had access to the work of Nardo or Chiereghini; but if the name given by the latter, as is probable, was applied to the Adriatic form, it is probably this species, as I have not seen any genuine *acuminata* from the Adriatic. In that case it would take precedence of the names given by Miss Bush and Mörch. I have not seen any specimen of Mörch's shell authentically identified, but his comparative remarks render it highly probable that he had the *V. oxytata* in view.

The genus *Rhizorus* of Montfort has been referred to this group, but it seems to be too uncertain to be adopted, and in some particulars would rather recall the *Cylichna marmorata* of Adams.

Volvula Bushii n. s.

This species is stouter, and its posterior process more acutely pointed than in *V. acuta;* its posterior end is more inflated and blunt than in *V. acuta* or *acuminata*, and the little sharp spine rises more abruptly from this dome. The anterior part of the shell is somewhat narrower than the posterior part, with very straight sides and columella, toward which it is evenly rounded in front. There is a long chink behind the pillar, a faint wash of callus on the body, and fine microscopic spiral striæ over the polished surface. The color is greenish white of a cretaceous quality. The columella is slightly reflected, but not twisted. Lon. 4.6; lat. 2.3 mm.

Habitat. Station 2602, 36 miles S. ½ W. from Cape Hatteras, N. C., in 124 fms., sand, bottom temperature 61°.0 F., U. S. Fish Commission.

Six specimens were obtained.

Volvula aspinosa n. s.

Shell white or yellowish, opaque, the young translucent, rather stout, ovate, the aperture as long as the shell, very narrow behind, wider in front, the outer lip sharp-edged, thickened inside, evenly rounded to both extremities, its middle part nearly straight; the left or opposite side of the shell much more arched than the right side; surface with well-marked incremental lines, numerous spiral microscopic striæ a little stronger toward the extremities; columella thick, short, straight, with a very minute chink behind it covered mostly by callus; apex dome-like, with a small rising in the centre, which in the most perfect and especially young specimens is pointed; callus on the body narrow, but well marked. Lon. 4.0; lat. 2.0 mm.

Habitat. Off the North Carolina coast, in 18 to 168 fms., sand, bottom temperature 61°–75° F., U. S. Fish Commission. Straits of Florida, 150–200 fms., Dr. Rush.

This very interesting species nearly bridges the gap between typical *Volvula* and *Cylichna.* Many of the worn or unfinished specimens show hardly a trace of an apical process; with the best developed ones it is only a raised point barely as high as the elevation of the outer lip beyond the apex, and never a spine as in the other species. There is something about its form and facies, however, which indicates its relationship even when the point is absent. Apart from the spine it is perhaps nearer *V. Bushii* than any of the others, but is more cylindrical, smaller, and has a narrower aperture. The shell seems unusually heavy for its small size when a perfectly mature specimen is examined.

FAMILY SCAPHANDRIDÆ.

Genus SCAPHANDER MONTFORT.

Scaphander punctostriatus MIGHELS.

Bulla punctostriatus Mighels, Proc. Bost. Soc. Nat. Hist., I. p. 49, 1841
Scaphander librarius Lovèn, Index Moll. Scand., p. 10, 1846.
Scaphander punctostriatus Verrill, Trans. Conn. Acad., VI. p. 273.

Habitat. Station 48, Gulf of Mexico, Lat. 28° 47′.5 N. and Lon. 88° 41′.5 W., in 533 fms., bottom temperature 41°.7 F., and Station 281, near Barbados, in 288 fms., ooze, bottom temperature 46°.5 F.

A single specimen was collected at each of the above stations.

These specimens exhibit a bluntness at the apex and a more Bulla-like form than the typical ones, and may form a variety *clavus*, distinguished from the type by the above features and by the simple apex, where the axis is prolonged into the outer lip directly without being twisted so as to form a sort of cup, as in the type of the species.

Scaphander Watsoni DALL.

Plate XVII. Fig. 10.

Scaphander? Watsoni Dall, Bull. M. C. Z., IX. p. 99, 1881.

Habitat. Off Sombrero Island, in 54–72 fms.; Barbados, 100 fms.; Station 20, in 220 fms., off Bahia Honda, bottom temperature 62°.0 F.; Station 36, in 84 fms., bottom temperature 60°.0 F.; Station 45, in 101 fms., bottom temperature 61°.7 F.; and Station 290, in 73 fms., Barbados, bottom coral and shell, temperature 70°.7 F. Also off Hatteras, in 63–124 fms., sand, and 324 fms., sand, in the Gulf of Mexico, bottom temperature 46° 5, by the U. S. Fish Commission.

Adults of this species were taken at Station 2376 by the U. S. Fish Commission in 324 fms. The shells alone were received. They are the American analogue of the European *Scaphander lignarius,* which they resemble more closely than any other species, but from which they can be distinguished by their uniformly more slender and cylindrical form and greater posterior attenuation. These differences hold good for the young as well as the adults. The outer lip generally rises higher, and the space on the posterior end of the spire is less wide and excavated in *S. Watsoni* than in the other species, but these characters vary somewhat in both species. I doubt if *S. Watsoni* ever reaches the size of the Mediterranean form; the largest I have seen measured 38.0 mm. long by 19.0 mm. in greatest diameter. *S. lignarius* of the same length generally measures about 24.5 mm. in diameter.

The magnificent *S. nobilis* Verrill, first dredged in 1209 fms., off Delaware Bay, was also found in the Gulf of Mexico by the U. S. Fish Commission in 1639 fms., at Station 2127.

Subgenus SABATIA Bellardi.

Sabatia Bellardi, Bull. della Soc. Malacol. Italiana, II. fas. iii. p. 209, 1876.
Sabalia Bellardi, l. c. sopra tavola C. figs. 5–8.
Type *Sabatia Isseli* Bellardi, l. c., p. 210.
Bulla plicata Bellardi, in Sismonda, Syn. Meth. Inv. Pedemont. Fos., 1842 (non *B. plicata* Deshayes).
Bulla uniplicata Bell., in Sismonda, ed. ii. 1847. (Nom. inapp.)

Sabatia bathymophila Dall.

Plate XVII. Figs. 9, 9 b.

Atys? bathymophila Dall., Bull. M. C. Z., IX. p. 98, 1881.

Habitat. Station 33, 1,568 fms.; Station 2, 805 fms.; Yucatan Strait, in 640 fms.; Station 162, in 734 fms.

The exterior of this species has the general form of *Scaphander nobilis,* but the minute sculpture and the characteristics in detail are alike distinct.

Additional and mature specimens of this species appear in the collections of 1878–79, from Station 162, off Guadelupe, in 734 fms., fine gray mud; bottom temperature 40°.0. These specimens show that the truncation of the axis is a character of the immature shell, and that the adult shows nothing of it, but has the body from one end to the other supplied with a broad solid flattened callus, which is especially protuberant (into the aperture) at the beginning of the posterior third. The outer margin of the callus has a sigmoid curve parallel with the inner outline of the columella and body; the inner margin is, however, somewhat irregularly transversely wrinkled, the mass of callus is much thicker in the middle third, and its surface is ornamented with flattened pustulæ irregularly disposed. This gives to the shell an abnormal appearance, which I took, in the single large (but, as we now know, immature) specimen referred to in the description, as an indication of disease in the individual. More material shows these characters to be normal and constant in their general features in the adult shells. The form of the aperture is well shown in the figures; its anterior portion is very oblique, — a feature only visible in a side view.

The type species, *Sabatia Isseli* Bellardi, bears no special resemblance to this shell; it is of quite different shape, sculpture, and proportions, with a callus more simple and proportionately less developed. A species with a differently shaped aperture and more general regularity of form both in shell and callus, yet closely allied to the present species, is *Bulla grandis* Seguenza (Form. Terz. di Reggio, p. 250, pl. xvi. fig. 4, 1880), from the Astiano division of the Calabrian Pliocene, collected at Reggio and Gallina. It is even larger than our species, measuring 33 × 26 mm., while the largest specimen of *bathymophila* is only 31 × 24 mm. In the latter a minute dimple indicates the position of the wholly immersed apex in the adult, while in the young the rough callus, though thin, is distinctly apparent in a specimen only 4.0 mm. long, and which has the nucleus and about three turns visible on the apex. The nucleus is reversed and half immersed, smooth and translucent. It is not wholly covered by callus until the shell is more than 7.0 mm. in length. When half covered it resembles the genus *Cryptaxis* of Jeffreys. The sculpture in the very young is the same as in the adult. *Scaphander niveus* and *gracilis* of Watson probably belong to this group.

Genus ATYS Montfort.

Atys ? Sandersoni Dall.

Plate XVII. Fig. 7.

Atys? Sandersoni Dall, Bulletin M. C. Z., IX. p. 99, 1881.

Habitat. Station 2, 805 fms. Off Havana (?), Sigsbee, a fragment in 450 fms. Station 20, off Bahia Honda, Cuba, in 220 fms., and at Station 127, near Santa Cruz, in 38 fms., sand, bottom temperature 76°.7 F.

Since describing this species I have found it in collections named *Atys caribæa* Orbigny, but the real *A. caribæa* which I have from Barbados in 100 fms. is a more pyriform, less cylindrical, and shorter species. I have seen no authentic specimen of Orbigny's shell, but the Barbados form agrees very well with his figure, and is doubtless the same as he described. It would if adult probably closely resemble *A. naucum*.

Genus CYLICHNA Lovèn.

Cylichna Verrillii n. s.

Shell similar to *C. alba* Brown in size and form with the exceptions following. It is bluish white and never has the brown outer coat of *C. alba*, though the extremely thin epidermis sometimes shows a light brown line marginating the apex. It is covered all over with fine spiral striæ. The columella is thickened and twisted more than occurs in *C. alba*, and in *C. Verrillii* has the effect of an incipient plait. Lastly the aperture extends farther behind the spire than in *C. alba*, and, instead of the margin being curved over to a slight callus sealing the apex, there is a well marked perforation, most marked in the adult shells. Largest specimen 7.5 long by 3.0 mm. wide.

Habitat. Off the coast of North Carolina, at Stations 2592, 2595, 2596, 2602, and 2612 of the U S. Fish Commission, in from 50 to 124 fms., sand, bottom temperature 58–75° F.

This species is larger and more cylindrical than *C. umbilicata* of Europe. It is nearer *C. cylindracea* var *lineata*, but is shorter in proportion to its width, and its body is also shorter in proportion to the whole length and more obliquely attenuated to the columella. It has a striking similarity to *C. alba*, when decorticated, until closely examined.

The other species common to the region are *C. Auberi* Orbigny, *C. occulta* Mighels, and perhaps *C. cylindracea* Pennant, specimens of which were received from Cuming as from the Antilles (?). *C. Krebsii* Mörch would seem to be suspiciously near *C. alba*, but I have seen no specimens, and the locality (Anguilla, etc.) seems very far south for that species. The suspicion arises that the specimens may have been derived from ballast thrown overboard by New England trading craft or New York fruit-carriers.

FAMILY BULLIDÆ.

Genus BULLA LINNÉ.

Bulla ? eburnea DALL.

Plate XVII. Fig. 6.

Bulla ? eburnea Dall, Bulletin M. C. Z., IX. p. 98, 1881.
? *Diaphana gemma* Verrill, variety.

Habitat. Station 43, 339 fms.

I have seen only one specimen of each of the above species, and they certainly appear very different in some respects; but the range of variation in these forms is little understood, and I do not feel confident that it may not be larger than generally supposed. In that case it is possible that the two forms may represent the extremes of one species. This should not be confounded with the *Bulla eburnea* of A. Adams, which is a member of the genus *Volvula*. Not possessing the soft parts, I have preferred to refer this species to the genus *Bulla*, though it may belong in the preceding family.

Bulla occidentalis A. ADAMS.

Bulla occidentalis A. Adams, Thes. Conch., Part ix. *Bulla*, p. 577, No. 49, pl. cxxiii. figs. 72, 73, 1850.
Bulla alba Turton, Zoöl. Journ., II. p. 364, pl. xiii. fig. 6.

Habitat. Antilles, in moderate depths, Adams and many others. Station 10, in 37 fms., Blake expedition.

This extremely common shell, under the influence of the sun and weather, bleaches white or nearly so. Two specimens of this kind were described by Turton, many years ago, under the above mentioned name, as British. They were of course exotic, and West Indian. But they have been referred to *B. striata* of the Mediterranean and West Indian faunæ. Turton's types in the Jeffreys collection enable me to correct this error.

Bulla abyssicola Dall.

Plate XVII. Fig. 11.

Bulla abyssicola Dall, Bulletin M. C. Z., IX. p. 97, 1881.
Bulla pinguicula Jeffreys MS., Ann. Mag. Nat. Hist., Oct. 1880, p. 318, No. 140 (name only). Watson, Chall. Rep., p. 638, 1886.

Habitat. Yucatan Strait, 640 fms. Station 43, 339 fms. (young). Station 136, off Frederikstadt, Santa Cruz, in 508 fms., ooze, bottom temperature 42°.5 F.

The nearest relative of this species appears to be the *Bulla utriculus* of Europe, which is longer, less cylindrical, and has a deep pit at the apex.

I have been enabled from an inspection of his type to determine that the manuscript name of Dr. Jeffreys applies to this species. It was obtained by the Travailleur in the Bay of Biscay, and also by the Challenger in 450 fms., mud, off Fayal, Azores, at (Challenger) Station No. 75. As no description has ever been attached to Dr. Jeffreys's name, it necessarily falls into synonymy.

It is possible that this species also is more nearly related to the preceding family, but the soft parts are as yet unknown.

Bulla Krebsii n. s.

Shell nearly the form of *B. occidentalis* A. Adams,* but more cylindrical and of an ivory porcellanous white. The posterior angle of the aperture is more sharp and the aperture near it narrower, while on the columella there is a faint revolving ridge which suggests a plait, though too obscure to be so named. The surface is brilliantly polished, with perceptible incremental lines. Callus on the body, thin with a very minute chink behind that on the pillar. Apex deeply sunken, pervious, scalate, showing nearly four volutions, the margin of the vortex rounded, with faint indications of a carinal line. Max. lon. 8.0; max. lat. 5.0 mm.

Habitat. Station 163, near Guadelupe, in 769 fms., sand, bottom temperature 39°.75 F.

I cannot make this fit in with any previously known species. It may prove not to be a typical *Bulla*.

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* Thes. Conch., Bulla, pl. cxxiii. fig. 73.

Bulla clausa n. s.

Shell small, subtranslucent, solid, of the form of *B. solida* (Gmelin, non Brugière), pale yellowish brown verging toward salmon color in the darkest parts; surface polished, with well marked incremental lines and extremely fine microscopic wavy spiral striæ over the whole surface. Aperture as long as the shell; wide anteriorly with a strongly arched callous white columella having a groove behind it and a thin callus on the body. Apex imperforate, meeting the descending outer lip with hardly a dimple. Max. lon. 11.5; max. lat. 7.75 mm.

Habitat. Florida, collector unknown, U. S. Nat. Museum, No. 55188.

This is the only shell, except the abyssal species like *eburnea* and *abyssicola*, having the solidity and characteristic form of typical *Bulla* which I have found without an apical perforation or distinct pattern of coloration, yet it seems too heavy and porcellanous to be referred to *Haminea*. It was probably collected by Stimpson.

Genus **HAMINEA** Leach.

Haminea succinea Conrad.

Bulla succinea Conrad, Proc. Acad. Nat. Sci. Phila., III. p. 26, pl. i. fig. 5, 1845; Dall, Hemphill's Shells, p. 324, 1883.

This species resembles *Haminea Guildingi* Sowerby, but is smaller, much more slender, and whiter. It is common in shallow water on the coast of Florida. A single specimen was dredged by the Blake at Station 247, off Grenada, in 170 fms., ooze, bottom temperature 53°.5 F.

This form is quite distinct from *Haminea solitaria* Say. The other species belonging to the region are *H. antillarum* Orb. (+ *H. cerina* Mke. 1853, and *H. guadelupensis* Sby. in Reeve, Conch. Iconica); *H. Guildingi* Swains. (? = *elegans* Gray in Suppl. Wood, Index Testac.); and *H. Petitii* Orb. (+ *H. glabra* A. Ad. in Thes. Conch.).

Family PHILINIDÆ.

Genus **PHILINE** Ascanius.

Philine infundibulum n. s.

In the multiplicity of species of *Philine* this one is best described by a comparative diagnosis. The soft parts externally are whitish, and resemble *P. quadrata* and *P. finmarchica* as figured by G. O. Sars.* It is nearest *P. quadrata* so far as shell characters go, and belongs to the group of species which have the spire entirely immersed and the posterior junction of the outer lip descending upon it in a sort of spiral. The shell is thin, pellucid, and finely closely spirally striate. It differs from that of *P. quadrata* chiefly by its larger size and the much smaller proportion wrapped in the body whorl. The soft parts, though larger, are remarkably like those of *P. quadrata*, but in that species the ventricular plates are wanting. In the present species they are present and of large size, the large (right) plate being lozenge-shaped, whitish and slightly concave on the side of insertion, covered with a convex polished nearly smooth brown coating on the interior, which is generally worn away by friction toward the center. The small plates are nearly the shape of half the large one, partly hollow and without granules. They resemble on the whole the plates of *P. angulata* Jeffreys as figured by Sars (*loc. cit.*, t. xii. fig. 10 d), but are larger, longer, and more pointed at the extremities. The adult shell comprises about two whorls, maximum length 12.0, max. breadth 9.0 mm. The large plate measures about 4.0 × 8.0 mm. The axis of the shell is wound in a wide pervious spiral, and the body whorl viewed from below extends about half-way across the base from side to side and two thirds the distance from the apex to the front edge.

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* Moll. Reg. Arct. Nov., pl. 18, figs. 9 d, 10 d.

Habitat. Station 20, in 220 fms., off Bahia Honda, Cuba; Station 146, in 245 fms., sand, near St. Kitts; Station 167, off Guadelupe, in 175 fms., sand; Station 188, off Dominica in 372 fms., sand; Station 192, off Dominica, in 138 fms.; Stations 274, 279, 291, and 299, near Barbados, in 118 to 209 fms. Bottom temperatures ranging from 43° to 64° F.

This seems to be a rather common species from the frequency with which it was taken. It differs entirely from *P. sagra* Orbigny, and is wider and squarer than *P. Candeana* Orb., in which moreover the spire is represented as visible for two turns at the apex.

Philine planata n. s.

Shell resembling that of *P. aperta* Linné, but flatter, smaller, more quadrangular, with a shorter and smaller body whorl, more polished surface, and with an impressed spiral line near the apex which extends to the margin where it marks a slight sinus, behind which the posterior margin is prolonged into a rounded prominent point. The shell is brilliantly polished and smooth except for lines of growth, but near the apex are a few microscopic faint spirals invisible without a lens. Ths spire is wholly immersed and makes in all about one and a half turns. The ventricular plates are formed like those of *P. infundibulum*, and not like those of *P. aperta*. The outer surface of the right plate has two longitudinal blackish lines. The two small plates are somewhat more arched than in *P. infundibulum*. The inner or triturating surface is similar in both. The length of the largest shell observed is 11.5 and its breadth 9.0 mm.

The soft parts are in general much the same as in *P. aperta*, but the cephalic lobe extends farther back and the foot is rounder, flatter, and less rolled up at the sides. As seen from below the body whorl of the shell equals only about one sixth of the total width.

Habitat. Station 192, off Dominica, in 138 fms.; Stations 274, 291, and 299, off Barbados, in 140 to 209 fms., bottom temperature 50° to 56°.5 F.

This species is readily distinguished from any other of the group by the posterior point, which, though smaller, recalls that of *Chelidonura* Adams. The soft parts, however, have no resemblance to the very peculiar, and perhaps partly hypothetical, figure of Quoy and Gaimard. *P. amabilis* Verrill is much nearer *P. aperta*, from which, as far as the shell is concerned, it chiefly differs by being a little narrower than the average *aperta*. The species are, however, quite variable in this respect.

Philine flexuosa M. Sars.

Philine sp. ind. Dall, Bull. M. C. Z., IX. p. 99, 1881.
Philine flexuosa (M. Sars) G. O. Sars, Moll. Reg. Arct. Norv., p. 302, 1878.

Habitat. Yucatan Strait, 640 fms.

The fragment above referred to was identified by comparison with an authentic specimen received by Jeffreys from Sars, and contained in the Jeffreys collection.

Family GASTROPTERIDÆ.

Genus GASTROPTERON Meckel.

Gastropteron sp. ind.

A species of *Gastropteron*, which to a casual inspection did not differ from the Mediterranean *G. Meckelii* Kosse, was obtained at Station 167, near Guadelupe, in 175 fms., sand, the bottom temperature being 55° F. Unfortunately, before the specimens could be studied, the alcohol in which they were preserved evaporated by reason of a defective stopper, and it only remains to chronicle the occurrence of the genus at the locality mentioned.

Family UMBRACULIDÆ.

Genus UMBRACULUM Schumacher.

L'ombrelle, Lam., Extrait d'un Cours, 1812. Gray, List of Gen. P. Z. S. 1847, p. 163.
Umbraculum, Schumacher, Essai, p. 177, 1817.
Gastroplax, Blainville, Dict. Sci. Nat., XVIII. p. 176. Bull. Soc. Philom., p. 178, 1819.
Umbrella, Lam., An. s. Vert., VI. p. 339, 1819; ed. ii., VII. p. 569. Blainville, Bull. Soc. Phil., p. 178, 1819. Férussac, Tab. Syst., p. xxix. Gray, Lond. Med.

Rep., p. 232, 1821. Cuvier, Règne An., ed. ii., 1830. Swains., Mal., pp. 252, 364, 1840. Carpenter, Lect., ed. ii., p. 86. Chenu, Man. de Conchyliogie, I. p 398. Gray, Guide, p. 204.

Ombrella, Blainville, Dict. Sci. Nat., XXXII. p. 267, 1824. Mal., p. 174, 1825.

Umbella, Orb., Moll. Cub., I. p. 115, 1841. Pal. Franc. Ter. Cret., II., 1842. (Not of Griffith and Pidgeon.)

Acardo, Menke, Syn. *olim*, 1828.

Operculatum, H. & A. Adams, Gen. Rec. Moll., II. p. 41, 1854. (Linné, Mus. Tess., 1753, not binomial.)

Patella, sp. of the older authors.

Not *Acardo*, Lam., 1801 (= whale's vertebra); nor of Commerçon, Brugière, Cuvier, Muhlfeldt, or Swainson; (= genera of bivalves.)

Type, *U. umbrella* Gmelin, East Indies.

The name *Operculatum*, applied by the brothers Adams to this genus, was not used by Linné in a binomial sense, and is barred by the rules of nomenclature now almost universally adopted.

The trivial French name applied by Lamarck was first Latinized by Schumacher in the form *Umbraculum* with a proper diagnosis. The French trivial name, which had been many years employed among collectors, never had any scientific standing until Latinized by Schumacher. Subsequently, Lamarck, in 1819, Latinized the word in the form *Umbrella*, and Blainville in the same year used the form *Ombrella*, but neither of these has any just claim to supersede the name proposed by Schumacher, which is the first Latin binomial appellation, accompanied by the requisite diagnosis, which appeared in scientific literature.

Umbraculum bermudense (Mörch?).

Plate XIV. Figs. 9, 10.

Shell rounded in front, subtruncate behind; thin, translucent yellowish, with a tint of orange near its apex; surface polished but irregularly malleated as if from irregularities of station; apex disproportionately pointed compared with the rest of the shell, erect, dwindling rapidly to a blunted point with a slight posterior tendency; on the back of this is apparently an obscure scar as of a dehiscent embryonal tip or nucleus; apex about the beginning of the posterior third; interior polished, anterior horns of the pedal muscles reaching about the anterior third united by a delicate arched line marking the attachment of the mantle; lon. 10.00; lat. 8.00; alt. 4.00 mm.

A single dead specimen was obtained by Lieut.-Com. C. D. Sigsbee at Station 62, off Havana, in 80 fms., while in search of *Pentacrinus*. While, in the absence of the soft parts, its position must remain a little uncertain, yet the correspondence of the shell with the young of *Umbraculum mediterraneum* is so close that I cannot doubt that this specimen is the young of a species of *Umbraculum* or *Tylodina*. Since in this state the specific relations seem indeterminable, it is probable that the species is that referred to by Dr. George Forbes of Bermuda, in a letter to John Eaton Dodsworth, published in the Philosophical Transactions in 1758, and figured there.*

As to the question whether this shell (named from the above figures by Mörch *Operculatum bermudense*, Mal. Blätt., XXII. p. 179, 1875) is distinct from the Mediterranean species, this still remains to be investigated.

Subgenus HYALOPATINA Dall.

Shell dextral, flattened, sculptured, ovate. Nucleus sinistral, immersed.

Hyalopatina Rushii n. s.

Shell oval, translucent bluish white, almost perfectly flat, extremely thin. Nucleus of less than one whorl, half immersed, the remainder rising above the surface, smooth, not polished. Upper surface nearly flat, except near the nucleus which is situated nearly in the median line and close to the posterior margin ; concentrically faintly undulated ; with faint concentric growth lines, and with very numerous radiating lines of extremely minute slightly elevated points, recalling the granules of *Poromya* on a much finer and more minute scale. They are so small as to hardly appear elevated, but more like radiating lines of opaque dots on the generally translucent surface. Margin regularly ovate, entire, extremely thin. Under surface of shell mostly polished, a little domed under the part in front of the nucleus ; there are faint markings (interrupted on the right side about the middle) which appear as if they might represent the area of muscular insertion, but the polish of the shell is such that this is not definitely ascertained. The sides of the shell are a little elevated, as if it had grown on a slightly concave surface, but the ends are depressed about to the same extent. Max. long. 9.3 ; max. lat. 7.5; posterior margin to nucleus, 1.8 mm.

Habitat. Off Great Isaac Light, Bahamas, in 30 fms., Dr. W. H. Rush. U. S. Nat. Mus. Coll. 61222.

This remarkable shell has been some time in the National Museum and has been submitted to several conchologists, and studied with much care. In the absence of any further information, I have come to the conclusion that it may be related to *Umbraculum*, from which, conchologically, it is separated by its oval form, posterior nucleus, and granulated surface. The discovery of a living specimen, however, may show the true relations of the creature to be elsewhere. It has a little the general appearance of an extremely thin, flat *Crepidula unguiformis* without a deck, and with the nucleus within the margin.

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* Plate XXXV. figs. 1, 2.

SUPER-ORDER PROSOBRANCHIATA.

Order PECTINIBRANCHIATA.

I have, in sum, followed Dr. Fischer in the arrangement of this group, modifying slightly the values and some details. I heartily concur in his expression of opinion, that a final arrangement of the groups included in this order awaits much fuller knowledge of the animals than we now possess.

The groups, hardly suborders, based on the dentition, are not of equal value. *Toxoglossa* and *Rhachiglossa* are certainly more closely linked than either or both with *Tænioglossa*. The latter leads the way toward *Rhiphidoglossa*. The place of *Gymnoglossa* is doubtful.

Super-Family TOXOGLOSSA.

The facts now known warrant us in believing that the teeth in this group represent the uncini of other groups, while the middle part of the radula is only known, so far, to occur in *Spirotropis*. On the other hand, the losses in *Rhachiglossa* have been at the edges instead of the middle, and the uncini and sometimes the true laterals or admedian teeth are the ones which are absent. Probably a fuller knowledge of the dentition will completely bridge the gap now existing between the two groups, and afford us examples of every degree of modification.

In separating this group into families I have adopted the groups rated as subfamilies by Dr. Fischer, merely assigning them a somewhat higher value.

FAMILY TEREBRIDÆ.

Genus **TEREBRA** (ADANSON) LAMARCK.

Of this genus the type is *T. subulata* Linné, and no species known to belong to the typical section are so far reported from the region we are discussing. The subdivisions of the genus which are represented are *Euryta* H. & A. Adams, *Subula* Schumacher, *Hastula* (Adams) Troschel, and *Acus* (Humphrey) Troschel. As until the dentition of all our species is examined the place they should occupy will be uncertain, the reference here to the subgenus in some cases is only provisional.

Euryta aciculata Lamarck is well known, and has been received from Venezuela and the Bahamas by the National Museum, as well as from the Antilles.

Hastula hastata Gmelin (+ *casta* Hinds and *obesa* Poulsen) has been received from Florida, Aspinwall, and the Bahamas, beside the Antilles.

Hastula cinerea Born (+ *salleana* Deshayes and *jamaicensis* C. B. Adams), is in the Museum from Corpus Christi, Texas, from Vera Cruz, Carthagena, and the West Indies.

Subula floridana Dall, has been dredged by the U. S. Fish Commmission near Key West in 45 fms., and in the Straits of Florida in 56 fms., sand. It differs from *S. triseriata* Gray (Indo-Pacific), which is its nearest relative, in the absence of the peripheral nodules forming the post-sutural series, and of the decussation, beside being less acutely elongated. It reaches a length of 70.0 mm. with a width of 10.25 mm. in twenty-six whorls of a pale straw color.

The species of *Acus* may be discriminated as follows: —

A. *Whorls concave.*

Both sides of the suture nodulous; no costæ; spirally grooved; white. Lon. 19.0, lat. 4.0 mm., whorls 13. *Acus concavus* Say.

Post-sutural nodules obsolete; the grooves replaced by channels separating raised threads; flexuous obscure costæ crossing the less concave whorl; wine-colored or variegated. Lon. 18.0, lat. 3.5 mm., whorls 12. *A. concavus* var. *vinosus* Dall.

B. *Whorls flat or convex.*

a. *Shell large, columella keeled.*

Shell coarse, white to dark ash-colored; strong, straight or slightly flexed, smooth, numerous costæ, with their interspaces coarsely threaded or grooved. Lon. 57.0, lat. 11.0 mm., whorls 20. *Acus dislocatus* Say.

b. *Shell small, acute, elongate, columella not keeled.*

Whorls convex, periphery destitute of nodules, whorls crossed by sharp-edged very flexuous waves; interspaces with crowded spirals and sharp grooves, which last do not cut the crests of the waves. Ashy to dark purple; band distinct. Lon. 21.2, lat. 4.7 mm., whorls 15. *Acus protextus* Conrad.

Waves straighter, flatter, fine and numerous, their edges cut by the spiral grooves, sometimes slightly nodulous at the intersections; band distinct; color pale brown to dark ashy. Lon. 15.5, lat. 4.0 mm., whorls 13. *Acus protextus* var. *lutescens* Dall.

Larger; pale yellow with a white pre-sutural area; the young sculptured like the preceding, the adults with the sutural band nearly obsolete; costæ fine, flexuous, rounded, numerous (26–28), with six to ten prominent primary spirals overriding the costæ and with the interspaces finely striate by a secondary series of spirals. Lon. 55.0, lat. 10.0 mm., whorls 18. *Acus nassulus* Dall.

Smaller; strongly cancellated and nodulous at the intersections; costæ about 18–20, straight; one faint anterior and three strong spirals between the sutural band and the suture in front; the interstices deep; band obscure; base more finely reticulated, the spirals stronger than the costæ; color white to pale buff. Lon. 18.0, lat. 3.5 mm., whorls 14. *Acus limatulus* Dall.

Larger; early whorls with one row of pointed nodules, later whorls with a double row of crowded narrower ones in front of the suture separated by a depression; surface wholly finely spirally striate with (30–32) crowded narrow straight costæ passing clear over the whorls on to the base; pale brown. Lon. 21.0, lat. 4.5 mm., whorls 12. *Acus benthalis* Dall.

Whorls flat; band smooth, convex; sides with four flat spirals decreasing forward from the band to the suture, and others still finer on the base; transverse sculpture obsolete except on the earliest whorls except faint incremental lines; shell porcelain-white, polished. Lon. 15.0, lat. 3.3 mm., whorls 13. *Acus Rushii* Dall.

This tabulation is the result of a study of a large collection of material from all points of the region. The number of forms is larger than was anticipated, knowing the variability of the species of this group.

Before proceeding to enumerate and describe the species obtained by the Blake, a few words on the other species may be of interest. The typical *Acus concavus* has been received only from the coast of the two Carolinas. The variety *vinosa* has been obtained in from two to thirty fathoms along the coast from Hatteras to Florida. It is abundant in Sarasota Bay and Charlotte Harbor, West Florida, frequenting the fucoids with finely divided fronds, the color of which it mimics. The operculum is somewhat lozenge-shaped, with an apical nucleus. The tentacles are mere eye-pedicels, and when not especially active the animal looks as if the eyes were sessile on the front of the head. The siphon is more than half as long as the foot, which is squarely truncate in front and extends far in advance of the eyes. The front margin appeared to be double and the tail was bluntly rounded. The soft parts were entirely white in the white variety. The proboscis is extremely large and internally corrugated. There is no radula, and there are no mandibles, according to Stimpson's notes.

The common *Terebra* of our coast is the well-known *Acus dislocatus* of Say. It extends from Maryland to Florida, Texas, Venezuela, the Bahamas, and the Antilles. It has a number of synonyms, of which the most common are *T. rudis* Gray and *T. Petitii* Kiener. It is found fossil in the Miocene and Pliocene of the Southeastern United States. Stimpson states in his unpublished notes that there are no jaws nor radula, but in the constriction of the proboscis (which is hourglass-shaped when half withdrawn) he found a series of grooved prickles. I suspect these were the poison fangs of the animal, which, as in some other *Toxoglossa*, are not set upon a radular band. If this suspicion be confirmed, this species will probably have to be removed from *Acus* (characterized by absence of teeth) and referred to *Hastula*.

The proboscis of this species when extended is of portentous magnitude. It is extruded base first like the rostrum of *Cypræa*. It is very muscular and internally corrugated, funnel-shaped, and biggest at the distal end, which encloses the victim, who is squeezed, smothered, and sucked to death simultaneously. The stomach is considerably smaller than the cavity of the proboscis, and is connected with it by a narrow œsophagus. From the posterior end of the

January 18, 1889.

stomach the intestine bends downward and forward, then takes a sudden turn backward. The eyes are seated on two small projections of the front margin of the head, not even by courtesy to be called tentacles. The foot is protruded as on a sort of peduncle, the connection with the body being constricted. The soft parts are white with traces of purple and yellow. The penis is recurved, sickle-shaped, rounded, with a small conical projection at the side of the tip. It is very large for the size of the animal. The other characters are much as in *A. concavus*. The animal is very sluggish and in captivity will remain partly protruded for forty-eight hours, apparently without stirring, though perfectly healthy. On the shells are found in May small circular ovicapsules adhering by the whole base and with a flat circular top like a lid a little set in. They are about one mm. in diameter, and are probably the ovicapsules of this species.

Acus protextus Conrad extends from Hatteras to Texas in 2–50 fms. I have not received it from the Antilles. The more distinctly reticulated variety I suppose from the figures to be *T. lutescens* E. A. Smith. It has been obtained in 2–20 fms., from Cape Fear, North Carolina, to the Gulf of Mexico.

Acus Rushii Dall was dredged in 8 fms. by Dr. W. H. Rush, U. S. N., five miles off Cape Florida, at the southwestern extreme of the peninsula. With its strongly marked flat spiral sculpture and brilliant whiteness, it is one of the most marked of our small species.

Three species only were collected by the Blake, but all of these appear to be undescribed.

Terebra (Acus ?) benthalis Dall.

Plate XXIX. Fig. 6.

Shell pale brown, fading to white near the apex, slender, acute, twelve-whorled; nucleus swollen, glassy, white, smooth, of a whorl and a half; succeeding whorls with a peripheral row of pointed tubercles, behind which the whorl is smoothed off to the suture, while in front a rib proceeds from each tubercle to the next suture. These are gradually modified from whorl to whorl, by the increase in the number of ribs and their being crowded, and their prolongation backward to the suture where they end in a second fainter tubercle; on the last whorl the tubercles have become little more than faint swellings on parallel crowded riblets, which seem to have been ligatured between the two rows. The whole surface is finely spirally striate, the base is rounded; the canal short and much twisted, the mouth narrow, elongated, and without callus. Max. lon. of shell, 21.0; of last whorl, 8.2; max. lat. of shell, 4.5 mm.

Habitat. Off Morro Light, Havana, in 100 to 400 fms.

This shell has a deep-water aspect, and though the soft parts were not obtained I have no doubt it lived at the depth from which it was dredged.

Terebra (Acus ?) nassula Dall.

Plate XXXVI. Fig. 8.

Shell slender, acute ; yellowish white, or pale buff with the color passing into yellowish white in the region of the sutural band; whorls eighteen, nucleus inflated, glassy, smooth, few whorled ; remainder of the shell not polished finely, uniformly sculptured ; in the early whorls the band is defined by a constriction in front of the suture, which does not interrupt the sculpture ; as the shell grows this becomes less pronounced and in the later whorls the band is often very feebly defined. The spiral sculpture consists of primary threads and secondary striæ ; there are two or three primaries on the band and four to eight on the rest of the whorl, the base being more feebly though similarly sculptured; the spirals override the very numerous close, fine, flexuous transverse ribs, there being in these characters the usual tendency to variability in strength, etc. ; the aperture is narrow and elongated with a faint wash of callus on the pillar ; canal short, twisted ; the siphonal fasciole very pronounced, its hinder edge marked with a sharp keel which does not enter the aperture nor appear on the columella. Lon. of shell, 55.0; of last whorl, 16.0; of aperture, 10.0 ; max. lat. of shell, 10.0 mm.

Habitat. Station 32, in 95 fms., Lat. 23° 32′ and Lon. 88° 5′ W., north of Yucatan in the middle of the Gulf of Mexico ; Station 36, in 84 fms., westward of the last, bottom temperature 60° ; Station 206, off Martinique, in 170 fms., sand, bottom temperature 49° ; Yucatan Strait, 640 fms. (adventitious ?).

The only described species which seems at all to resemble this is *T. flava* Gray, which is an immature shell (referred to the Indo-Pacific *T. cancellata* Quoy by Tryon) and might be the young of this or a good many other species. *T. protexta* var. *lutescens* presents similar characters on a minor scale.

Terebra (Acus) limatula Dall.

Habitat. Barbados, 100 fms.; Gulf of Mexico at Station 36, in 84 fms.; Bahamas, west of North Bemini, in 200 fms. (Dr. Rush); U. S. Fish Commission Station 2402, in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Fla., in 111 fms., mud; and Station 2610, 24 miles S. E. from Cape Lookout on the Carolina coast, in 22 fms., sand, bottom temperature 79°.0 F.

The sculpture of Antillean specimens tends to be stronger, the alveoli between the ridges deeper, and the spirals fewer than in the northern specimens. The latter usually have three or four above the suture, the Antilleans two or three. If these differences are worth naming, the variety may be called *T. limatula* var. *acrior*.

FAMILY CONIDÆ.

This family, being chiefly composed of littoral or comparatively shallow water forms, is hardly represented in the Blake collections. A clean-up of a number of dead shells obtained in various places affords some notes of interest.

Genus **CONUS** LINNÉ.

Conus Mazei DESHAYES.

C. Mazei Deshayes, Journ. de Conchyl., XXII. p. 64, pl. i. fig. 1, 1874. Tryon, Man., *Conus*, p. 39, pl. ii. fig. 10 (bad), 1884.
? *C. gracilis* Sowerby, P. Z. S. 1875, p. 125, pl. xxiv. fig. 6.

Station 262, 92 fms., Grenada, bottom of coral and shells; Barbados, 100 fms.; Station 132, 115 fms., Santa Cruz, bottom rock and broken shells, bottom temperature 65° F.

This remarkable cone, recalling in its normal painting *Scaphella Junonia*, as observed by Deshayes, was not obtained by the Blake in perfect condition except for a few young specimens; broken specimens, however, nearly as large as the figured type, are included in the collection, and afford the following observations.

The middle surface of the species is not always, nor it would seem generally, smooth as in the type. None of the Blake specimens are smooth. All are strongly and rather uniformly sulcate all over; the revolving ribs flat and smooth, broadest in the middle of the whorl, while the narrower sulcations are prettily reticulated by raised, close transverse threads. The nucleus is small, smooth, glassy, and rather loosely coiled, in three turns.

The nine revolving series of squarish brown spots may be faint, or even absent. There may exist with them a series of three obscure pale bands beginning at the carina, and alternating with cloudy brownish bands with the color more or less distributed in the shape of ill-defined transverse narrow flammules. The spots may be superposed on this, or absent. It may also be nearly uniform brown with whitish spots. The anterior end of the columella may also be of a darkish brown. The width varies in proportion to the length. The young shells are proportionately wider. The nearest relative of *C. Mazei* appears to be *C. Orbignyi* Audouin (*planicostatus* Sowerby), which apparently differs from the above mentioned banded variety, chiefly in being wider. Sowerby's *C. gracilis* may perhaps be an unusually brown specimen, though of this I am not confident.

Conus cedonulli LAMARCK.

C. cedonulli Lamarck, Reeve, Conch. Icon. *Conus*, pl. ix. fig. 46 f.

Two small specimens from Barbados; Station 290, in 73 fms., coarse coral bottom, temperature at the bottom 71° F.

Conus proteus Hwass.

C. proteus Hwass (1791), Tryon, Man. *Conus*, p. 12.
C. spurius Auct. as of Gmelin.
C. leoninus Hwass, 1791.
C. ochraceus Lam., + *C. breviculus* Sow., + *C. armillatus* C. B. Adams, *fide* Tryon, *l. c.*

One small specimen, painted almost exactly like *Scaphella Junonia* and hardly to be recognized as identical with the adult, except by comparison with a series, was obtained on the west coast of Florida in 19 fms.

Conus Pealii Green.

Conus Pealii Green, Trans. Alb. Inst., I. p. 123, pl. iii. fig. 3, 1830; Thes. Conch., figs. 393, 394.
Conus Stearnsii Conrad, Am. Journ. Conch., V. p. 104, pl. x. fig. 1, 1869.
Conus candidus Kiener, Coq. Viv., tab. xcvii. fig. 1, *fide* Tryon, *l. c.*

This shell has been confounded with *C. floridanus* Gabb by Sowerby, and by many collectors. It is not rare on the west coast of Florida and the Keys. It prefers grassy ground in shallow water. Of late years it has been found by Jewett, Stearns, Velie, and others. Mr. Conrad redescribed it in ignorance of Green's paper on American cones.

Conus Pealii is generally about three quarters of an inch in length, the breadth, at the sharply keeled shoulder, less than half the length; smooth behind, grooved on the anterior half; with gradate, slightly excavated or channelled spire, marked only by arched lines of growth; livid gray color, with chestnut blotches, the sides articulated with numerous narrow fillets of brown and white, the brown spots always smaller, sometimes obsolete, the white sometimes merely translucent, brightest on the keel; the interior of the mouth white and dark brown; epidermis smooth and extremely thin, the sides nearly right lines, the middle of the outer lip arched forward.

C. Pealii was not collected by the Blake, but I have introduced a notice of it here on account of its relation to some of the other species mentioned, and because it has been so generally misunderstood.

Conus Agassizii Dall.

Plate IX. Figs. 8, 8 a.

Conus Agassizii Dall, Report on Moll. Blake, Part i. pl. ix. figs. 8, 8 a, and expl. to plate, Sept., 1886.

This shell was at first thought to be a transitional form, uniting *C. pygmæus* Reeve and *C. Pealii*, as the younger specimens first studied lent themselves to such a conclusion. The receipt of a large specimen collected at Bermuda (45 × 23 mm.) shows that this idea was incorrect, and that it is distinct from either of them.

The adult is elegantly spindle-shaped, falling in a little toward the keel which is more or less regularly minutely dotted with reddish brown at rather long intervals. The suture is very distinct, almost channelled. The spire is without revolving sculpture, the sinus deeply concavely arched. There are about seven strong grooves in the adult anteriorly. The very young (fig. 8 a) is deeply grooved all over, as in *C. verrucosus.* In the adolescent shell the epidermis is thin, and nearly smooth ; it is a little rougher but still thin in the adult. The former has a somewhat waxen translucency, the adult is porcellanous. The young is waxen white with faint pink cloudy suffusion and yellowish ill-defined brown patches. These colors are faint at all ages and form no definite pattern, except the dots on the keel.

In the young, by transmitted light, it can be seen that there are articulated lines of opaque and more translucent character, but these have hardly any color and are lost in the adult state. The interior of the aperture is white or nearly so, the mouth is rather wide, the apex of the spire neatly pointed. The adult has about ten whorls, with a total length of 45.0, and a maximum width of 23.0 mm. The spire rises 10.0 mm. behind the aperture.

Specimens were dredged by the Blake at Station 132, in 115 fms., near Santa Cruz Island, and in 76 fms. at Station 272, Barbados. It is also found at Bermuda, where Prof. G. Brown Goode obtained a large specimen, and others have since been collected by Prof. A. Heilprin of Philadelphia.

Conus Villepinii Fischer & Bernardi.

C. Villepinii F. & B., Journ. de Conchyl., V. p. 292, t. ix. fig. 12, 1857.

Station 167, 175 fms., sand, Guadalupe, bottom temperature 55° F. Several small specimens apparently of this species, one or two of which were fresh. The type came from the islet of Marie-Galante near Guadalupe. This species has also been dredged by the U. S. Fish Commission on Little Bahama Bank in 338 fms., at Station 2655. It is very close to and possibly identical with *C. Cleryi* Reeve, which came from the northern shores of Brazil.

Conus daucus Hwass.

C. daucus Hwass, Encycl. Meth. Vers, I., Part ii. p. 651, 1791.

One or two dead specimens of the variety *C. Reevei* Kiener, from Station 272, 76 fms., coarse sand, Barbados.

Conus centurio Born.

C. centurio Born, Mus., pl. vii. fig. 10, 1780.

A specimen from Station 127, 38 fms., sand, Santa Cruz island, is identified as belonging to this species by Mr. G. W. Tryon, Jr. It is a young shell, and might perhaps be referred with equal probability to *C. flavescens* Gray. Bottom temperature, where found, 77° F.

Conus centurio is however found in the Antilles and Gulf of Mexico. A specimen was collected by the U. S. Fish Commission at Station 2373, in 25 fms., between the mouth of the Mississippi and Cedar Keys, Florida.

Conus flavescens GRAY.

C. flavescens Gray, Sow., Conch. Ill., fig. 68, 1841; Reeve, Conch. Icon. *Conus*, pl. xxx. fig 168, 1843.

Specimens agreeing with the above figures have been received from Governor Rawson and two other sources, from the Bahamas; though Tryon in his monograph queries Ceylon and Australia for the species. Young specimens are extremely variable in painting, but generally with a central more or less well defined paler band ornamented with a few brown blotches or dots. One is pure white with a faint purplish tinge at the anterior end of the shell. The epidermis is thin, nearly smooth, translucent. Such young shells were collected by the Blake at Santa Cruz, Station 132, 115 fms., hard bottom; Grenada, Station 247, 170 fms. ooze; and Barbados, Station 290, 73 fms., coral; bottom temperature 54–71° F. Some of them were quite fresh, and though not containing the animal when received by me, looked as if they might have been living when collected. Reeve's figure of *C. magellanicus* Hwass looks very much like some of these young shells.

Among the species which are definitely known to inhabit the Floridian region and Antilles and not previously mentioned here, are the numerous varieties of *C. pygmæus* Reeve, one of which has been named *C. Melvilli* by the late Mr. Sowerby. *C. columba* Brug., *C. pusio* Lam., and *C. papillosus* Kiener probably belong hereabouts.

Conus floridanus Gabb was named *floridensis* by Mr. Sowerby, who mixed it up with *C. Pealii. C. verrucosus* and *C. mus* are among the commoner Antillean species, and I have, from various parts of this region, *C. nebulosus* Sol., which indulges in some extraordinary variations, *C. achatinus* Lam., and, most interesting of all, *Conus Delesserti* Recluz, from a variety of stations. This last is a Red Sea species, closely related to *C. centurio* as is *C. daucus* to *C. flavescens.*

A beautiful species with very much the color of *roseo-tinctus* Sowerby, but with the form and size of *subcarinatus* Sowerby (see Thes. Conch. *Conus*, pl. xxv. figs 604 and 615), the dark streaks longer and darker than in *roseo-tinctus* and always followed by an equivalent pale area, a thickish epidermis, and the top of the whorls excavated and striated, was dredged in 27 fms., near the coast of Yucatan, by the Fish Commission, and has been named by me *Conus amphiurgus.*

FAMILY PLEUROTOMIDÆ.

The species of this family are, as is well known, extremely numerous; and of a majority, the operculum, if present, and the soft parts are unknown. A thorough review of the family, recent and fossil, would be a work of some years, well worth doing, but impossible for the writer at the present time. Much has been done toward bringing together the material by Tryon, Bellardi, Weinkauff, and others, while the arrangement of the subordinate groups adopted by Dr. Paul Fischer in his Manual is by far the best we have. It will, practically, be followed here, with some trifling deviations; but as the shells with which I have to do have for the most part no traces of the soft parts, I shall neglect for the time the subordinate divisions, into which a reference would be a merely tentative character. As in other cases, I shall not adopt names which appear in the works of authors anterior to, or who did not adopt the binominal nomenclature of Linnæus; and when a name is of reasonably euphonious construction and Latinity of form I cannot follow those who, after many years of usage, would modify it into conformity with an arbitrary standard of classical purity. A self-evident misprint or an error of spelling in a proper name which has not become fixed by usage may be corrected, but the essential principle of nomenclature is to have a fixed name for an object, and this principle should not be violated for slight cause. It is much more important that names should be permanent, than that they should be elegant, of pure Latinity, or of applicable meaning.

It is highly probable that, when the eight or nine hundred species of *Pleurotomidæ* known from the Tertiaries of Europe are compared, a number of the recent species about to be described will be found represented. But even the best figures are not satisfactory for critical comparison, and the last great work of Bellardi is not accessible to me; so that the final correlation of the recent and fossil forms will not be attempted here, though such comparisons as are practicable, especially with the Antillean Tertiary fauna, have been carefully made.

It is somewhat curious that in the until recently three most available manuals, Woodward, H. & A. Adams, and Chenu, under the head of *Pleurotomidæ* no references are made to the office or function of the "notch," and in each case there is said to be a "slit" in the mantle behind. In Woodward alone is the anal or excurrent function of the posterior sinus alluded to, and by him only in general terms, while the *Pleurotomidæ* are not mentioned in his list of examples. It is now known, that in the *Fissurellidæ*, the *Pleurotomariidæ*, the *Pleurotomidæ*, and numerous other groups of Gasteropods, the anterior sinus when it exists, aided by an extensile fold of the mantle (siphon), forms the channel of water to the gills, while the secondary or posterior sinus serves as a sluice for the ejection of water (after it has passed over the gills) and the renal and intestinal excretions. In this way pollution of the inward current to the gills is avoided. In very few species of *Pleurotomidæ* is there anything which can properly be called a "slit" in the mantle. There is a sinuosity of the elastic border of the mantle, which often disappears after death or immersion in alcohol. The long clavate penis of the male lies nearly under the sinus in most species, and the existence of the sinus may facilitate copulation, but this is still somewhat doubtful.

The band left on the outer surface by the curves of the lines of growth across the sinus has frequently to be referred to in descriptions, and some term has been needed which shall, without too much circumlocution, serve to indicate this feature, which occurs in so many molluscan shells. I have elsewhere proposed to use for the purpose the term "anal fasciole," which I trust may prove as convenient as the term "siphonal fasciole," introduced some years since by Gill, has been for a similar feature on the outer side of the canal in many Gasteropods. This term "anal fasciole" for the band or trace behind the notch has been approved by Dr. Paul Fischer and other experts, and will be used when necessary throughout this Report.

Genus PLEUROTOMA Lamarck.

Subgenus PLEUROTOMA s. s.

Pleurotoma albida Perry.

Pleurotoma albida Perry, Conchology, expl. pl. xxxii. fig. 4, 1811.
Pleurotoma virgo Lamarck, An. sans Vert., VII. p. 94, 1822; ed. Deshayes, IX. p. 350, 1843; Tryon, Man., VI. p. 168.
Buccinum sinuatum Martyn, Univ. Conch., pl. xciv. right-hand figure, 1789 (not of Born).
Turris candida Humphreys, Mus. Calonnianum, p. 34, 1797 (*fide* Dillwyn).
Murex tornatus Dillwyn, Cat. Shells, II. p. 715, 1822, *ex parte*.
Murex virgo Wood, Index Test. *Murex*, No. 63, pl. xxvi., 1818.
Pleurotoma haitensis Sowerby, Quart. Journ. Geol. Soc., VI. p. 50, 1849.
Pleurotoma virgo Moore, Quart. Journ. Geol. Soc., IX. pp. 129, 130, 1853.
Pleurotoma Barretti Guppy, Quart. Journ. Geol. Soc., XXII. p. 290, pl. xvii. fig. 6 (*bonum*), 1866.
Pleurotoma antillarum Crosse, Journ. de Conchyl., XIII. p. 34, pl. i. fig. 8, 1865, not of Orbigny (young shell).
Pleurotoma Jelskii Crosse, *op. cit.*, p. 33, pl. i. figs. 6, 7, 1865 (var. young).
Turris virgo Gabb, Santo Domingo, p. 205, 1873.

Habitat. Off Sombrero, in 54–70 fms.; off Havana, in 250 fms.; Barbados, 100 fms.; Station 36, Gulf of Mexico, in 84 fms.; Station 132, near Santa Cruz, in 115 fms.; Station 167, in 175 fms., mud, near Santa Cruz; Station 206, off Martinique, in 170 fms.; Station 262, near Grenada, in 92 fms. Also at U. S. Fish Commission Station 2120, in 73 fms., mud, off Grenada; Station 2414, living, in 26 fms., sand, between Tampa Bay and Dry Tortugas. *P. albida* var. *tellea* at Stations 2402 and 2404, in 60–111 fms., mud and sand, between the delta of the Mississippi and Cedar Keys, Florida.

This shell was first named by Martyn, but his name under the system then prevailing was preoccupied. Humphreys's name was unidentifiable, except by Dillwyn, who saw the specimens, and he gave neither description, figure, nor reference, but was the first to mention the West Indies as its true habitat. Perry names it, and gives a description and a better figure than that in Reeve's Iconica, but a wrong habitat. His name should be adopted. Wood's specific name of *virgo*, adopted by Lamarck, is seven years later in date. The best figure, singularly enough, is that of Guppy, who figures it from the Tertiary of Hayti.

The species probably lives between the 100 fm. line and the shore. All the specimens above cited from deeper water were dead, and probably disgorged by fishes. The only living ones I have seen were dredged in 26 fms. by the Fish Commission. The operculum is much like that of *Conus*, long, narrow, strong and thick, rounded behind, pointed in front, with an impressed line running its length parallel with and nearer the right side, which is straighter than the left margin. The nucleus is apical, the area of attachment covers nearly the whole operculum, having a smooth narrow raised border around an impressed space concentrically granosely sculptured. On the right side the raised margin is very narrow. The shell reaches a length of 105 mm. or more, and the typical form has sharp-edged strong spirals, a narrow, flat anal fasciole more prominent than any of the spirals, faint transverse sculpture, and a thick pillar with a tendency to become umbilicated. The young shells described by M. Crosse look very different, and only after comparison of many specimens was I able to convince myself that Gabb and Tryon were right in regarding them as synonyms. The shell is always of a pure yellowish white, without markings, though the apex of the very young is sometimes tinged with reddish brown. The nucleus is inflated, glassy, translucent, of two whorls, which are smooth, then become marked with semilunar riblets which pass into a tubercular keel at the periphery which becomes smooth, sharp, and takes the normal character very soon.

Pleurotoma albida var. tellea Dall.

This form differs from the normal in having the revolving sculpture fainter and more uniform, the transverse sculpture much stronger and more elevated, giving a finely reticulated appearance to the surface. The anal notch is more shallow, the canal more slender, usually without any umbilical chink. The shell reaches a length of over 100 mm. with a maximum diameter of 26.5 mm.

Pleurotoma (albida var.?) vibex Dall.

Shell resembling in a general way the young of *P. albida* of the same size; the nucleus is the same, the spiral sculpture resembles that of *P. albida* but is flat-topped instead of sharp; the transverse sculpture is less prominent, the spirals somewhat more numerous; the chief character which strikes one on comparing the *P. vibex* with *P. albida* is that the shell is surrounded with bands of olive-green color, polished, narrow and resident in the epidermis, but visible through the translucent shell in the aperture. These bands sometimes fill the spiral channels; sometimes there are two olive bands separated by a pale one between two of the elevated spirals; sometimes the flat tops of the spirals are thus colored; in general there will be about ten of these olive stripes on the last whorl. They extend only over the whorl, the pillar from its junction with the body is destitute of them, and, when fresh, is of a delicate rose color, which is apt to fade. This white or rosy rostrum contrasts vividly with the striped body and spire. Lon. of shell, 19.0; of spire, 8.5; of white rostrum, 8.75; max. lat. of shell, 4.75 mm.

Habitat. Off Havana in 80–127 fms., Sigsbee; Station 143, off Saba Bank, in 150 fms., bottom temperature 63°.2 F.

This may be, as Mr. Tryon claimed when it was shown him, a variety of *P. albida*, but I incline to the belief that it is a good species.

Pleurotoma periscelida Dall.

Plate XXXII. Fig. 2.

Shell stout, fusiform; covered with a straw-colored epidermis; elaborately sculptured; ten whorled, exclusive of the nucleus; spiral sculpture consisting of (1) a cord at first rounded and irregularly constricted at short intervals, later flattened with numerous transverse waves and indentations; this band becomes gradually wider, has two small grooves along its center, and at the sides, especially the sutural side, it overhangs the channels on each side of it; from the first this band conceals the suture, toward the end of the last whorl it becomes less prominent and descends slightly; (2) a broad elevated band grooved centrally and covered with twin nodules in pairs one above the other, which on the later whorls are somewhat reniform; this band represents the fasciole or pathway of the square-cut anal notch; (3) in the channel between the two last are two small, elevated, rounded nodulous cords; (4) in front of the fasciole and on the base of the last whorl are four or five strong spirals, and between these and in front of them on the canal are numerous smaller ones, all crossed and roughened by the transverse ridges of growth; one or two of these spirals are visible on the whorl before the last, the earlier ones not showing any of the basal spirals; transverse sculpture of coarse elevated incremental lines more or less visible over the whole shell; aperture rather wide, canal narrow and slightly curved; outer lip with a deep notch squared at the bottom, then strongly arched forward, later contracted for the canal; margin simple, sharp; inner lip white, smooth, simple, slightly excavated; inside the outer lip are six or eight strong liræ falling short of the margin; pillar nearly straight, attenuated and twisted in front, making the end of the canal flare a little; there is no umbilical trace. Lon. of shell, 40.5; of last whorl, 27.0; of aperture, 22.5; max. lat. of shell, 15.0 mm. Nucleus defective in the specimens.

Habitat. U. S. Fish Commission Station 2143, living in 155 fms., mud, near

Monosquillo. Station 2601, in 107 fms., sand, off Hatteras, N. Carolina, dead and worn.

This species is one of the most remarkable and elegant of any from the deeper waters. It belongs to the group of which *P. speciosa* Reeve forms a member, by its sculpture, though whether the nucleus would agree with that species is uncertain. At present our judgment on such subdivisions as *Gemmula* Weinkauff, founded on nuclear characters, must be held suspended; so far as our knowledge goes, nuclear characters have little absolute systematic value in this group, and their relative value remains to be determined.

Subgenus LEUCOSYRINX Dall.

Shell white or pale without color pattern; thin; the anal notch behind the periphery or at the suture; sculpture delicate, of spiral keels or threads and often oblique riblets on the shoulder of the whorls; peripheral keel if present not recurved; operculum thin, nucleus apical, scar of attachment small; larval shell glassy, rounded or keeled; other shell characters as in *Pleurotoma*. Type *Pleurotomella Verrillii* Dall.

This group is intended to contain the operculated species of *Pleurotomidæ* which are so characteristic of the archibenthal region. They are distinctly contrasted with the coarse, spotted or maculated shallow-water species of *Pleuroma* proper, by their thin, white, delicately sculptured shells; they are apart from *Drillia* by having no subtubular projection of the anal notch when adult and no thick varix to mark their maturity; they are separable from the archibenthal Drillias also by their larger shells, longer canal, and more inflated habit. The anal notch is generally wider, more rounded and nearer the suture than in the typical *Pleurotoma*, and the operculum proportionally wider and more delicate.

Leucosyrinx Verrillii Dall.

Plate X. Fig. 5.

Pleurotoma (Pleurotomella) Verrillii Dall, Bull. M. C. Z., IX. p. 57, August, 1881.

Habitat. Station 41, 860 fms.; Station 173, living in 734 fms., ooze, off Guadalupe, bottom temperature 40° F.; Station 46, latitude 25° 43′ N., longitude 84° 47′ W., in the Gulf of Mexico, in 888 fms., ooze. Also at U. S. Fish Commission Stations 2623 *a*, 2626, and 2628, 25 to 100 miles off Cape Fear, North Carolina, in 150 to 528 fms., ooze, temperature 39° to 45° F.; Stations 2677 and 2678, off Cape Fear, in 478 and 731 fms., ooze, temperature about 39°; and Station 2384, in 940 fms., mud, Gulf of Mexico, between the Mississippi delta and Cedar Keys.

This fine species appears not to have been found by the Challenger, or north of Cape Hatteras. It is distinguished among several allied forms by the distinct fine even threads on the fasciole, the form and number of its riblets, and the absence of any pre-sutural wrinkles or coronating band.

Leucosyrinx Sigsbeei Dall.

Plate XI. Fig. 10.

Pleurotoma (*Pleurotomella* ?) *Sigsbeei* Dall, Bull. M. C. Z., IX. p. 57, August, 1881.

Habitat. Station 33, 1568 fms., Yucatan Strait, 640 fms. (young). Station 236, off Bequia, living in 1591 fms., ooze, bottom temperature 39°.0 F.

The differences between this and the last species were noted in the original description. Both species have moderately small subglobular glassy inflated nuclei, not large enough to give a mamillary look to the apex, but larger than in the average *Pleurotoma*. In both, the fine spiral threads cover the whole fasciole and there is no coronet in front of the suture.

Leucosyrinx tenoceras n. s.

Plate XXXVI. Fig. 5.

Shell long, very slender, the aperture longer than the spire behind it ; white or ashy, the nucleus yellowish, subglobular, glassy, smooth ; whorls ten, beside the nucleus ; suture appressed, a coronet of short, elevated, backward pointing wrinkles marginating the whorl in front of it; fasciole wide, with obsolete sculpture or smooth, polished, very sloping, subconcave ; shoulder of the whorl angulated, ornamented (on the whorl before the last) with about fourteen nodular riblets ; these riblets on the early whorls are short, stout, and very prominent, later they become more slender and oblique, and on the last whorl tend to become obsolete entirely ; the whole shell except the fasciole is covered with fine flattened threads, not prominent, and often wavy or obliquely directed from irregularities of growth ; aperture long, rather narrow ; canal narrow, long, flaring a little at the end ; outer lip thin, simple, broadly arched forward, with no internal liræ ; notch deep, very wide, extending from the suture to the shoulder ; pillar lip slightly excavated, white, smooth ; pillar straight, attenuated in front ; whorls moderately full, having a drawn-out appearance ; operculum thin, pear-shaped, acutely pointed, with a thin marginal rib ; pale horn-color. Lon. of shell, 60.0 ; of last whorl, 40.0 ; of aperture, 33.0 ; max. lat. of shell, 14.0 mm.

Habitat. Station 161, near Guadalupe, in 583 fms., sand, temperature 41°.0. Station 265, near Grenada, in 576 fms., ooze, temperature about 40°.0. Also at U. S. Fish Commission Station 2392, in 724 fms., mud, Gulf of Mexico between the Mississippi delta and Cedar Keys, Florida, temperature 40°.7 ; and Station 2677, off Cape Fear, North Carolina, in 478 fms., mud, temperature 39°.3 F.

This is more slender than either of the preceding species, and has a smoother and always coronated fasciole, which rarely shows spiral sculpture.

Leucosyrinx subgrundifera Dall.

Plate XXXVIII. Fig. 1.

Pleurotoma subgrundifera Dall, in Agassiz, Three Cruises of the Blake, II. p. 66, fig. 283, 1888.

Shell fusiform with an acute spire, nine whorls, and a globular brownish, shining, smooth nucleus of about two whorls; shell with a polished surface over a straw-colored very thin outer layer, the only transverse sculpture being due to the faint incremental lines and irregularities of growth; spiral sculpture of an extremely sharp and wide keel nearer to the suture in front than to the one behind, and in some cases having its edge actually curved forward and overhanging; the margin of the keel is smooth and a little rounded; it is fainter on the last whorl of the adult; in front of the keel on the base is a slight angulation or hardly elevated thread on which the suture coils; in front of this are some faint spiral markings, hardly breaking the smoothness of the surface; suture distinct; aperture narrow; notch deep, wide, extending from the suture nearly to the edge of the keel; outer lip thin, arched forward, not internally lirate; pillar lip slightly excavated, white, smooth; pillar straight, attenuated in front, canal narrow, straight, shallow; base moderately rounded in the adult, flattish in the young; operculum as in *L. tenoceras*. Lon. of shell, 30.0; of last whorl, 20.3; of aperture, 17.0; max. lat. of shell, 11.0 mm.

Habitat. Yucatan Strait, a fragment in 640 fms. U. S. Fish Commission Station 2384, Gulf of Mexico, in 940 fms., mud, between the delta of the Mississippi and Cedar Keys, Florida; and Station 2628, in 528 fms., sand, 100 miles S. E. by S. from Cape Fear, North Carolina; temperatures 38°.7 and 39°.6 F.

Some specimens of this singular shell look like a lot of successively smaller umbrellas, one over another.

None of the Challenger species approach this one. The *Surcula staminea* and *S. gonioides* of Watson are carinated, but the keel is far less pronounced than in the present species, and they do not appear to have that curious chalky outer layer like a coat of whitewash varnished, which is so peculiar in *L. subgrundifera*. In the last there is some variation in the strength of the basal spirals, but in none of them do the latter rise much above the surface.

Subgenus ANCISTROSYRINX Dall.

Ancistrosyrinx Dall, Bull. M. C. Z., IX. p. 53, Aug. 12, 1881.
Candelabrum Dall, 1878, non Blainville, 1830.
? *Columbarium* sp. Tryon, non Von Martens.

This very elegant section of the family extends from the Eocene, where it has been found at Jackson, Mississippi, and probably in Europe, to the existing fauna. The only species which may perhaps be referred to it that was known before the writer called attention to it is *Pleurotoma cedonulli* Reeve, from Panama. It is impossible to determine with certainty from Reeve's figure whether his species is a true *Ancistrosyrinx* or not, but it looks like one, and he expressly states that the apex is sharp and the sinus large, which would exclude it from *Columbarium*, to which Tryon referred it.* The latter even considered it a synonym of the Chinese *C. pagoda* Lesson, which has a bulbous nucleus and no sinus. A species from the Eocene of Dry Creek, Jackson, Mississippi, was described by Mr. T. H. Aldrich in 1886; it is distinct from the recent forms, with which I compared it, having a different sculpture about the sinus, and was named *Pleurotoma* (*Ancistrosyrinx*) *columbaria* by Mr. Aldrich. The figures of *P. calliope* Brocchi and *P. controversa* Jan from the Italian Tertiaries recall this group, but, if they are strictly to be relied upon, the resemblance is superficial and consists chiefly in the dentate carina. Nothing referable to this group was obtained by the Challenger.

Ancistrosyrinx elegans Dall.

Plate XXXVIII. Fig. 3.

Ancistrosyrinx elegans Dall, Bull. M. C. Z., IX. p. 54, 1881. Agassiz, Three Cruises of the Blake, II. p. 66, fig. 282, 1888.

Habitat. Florida Reefs, Pourtalès, 1870. Station 2, 805 fms., four miles from Havana, Agassiz, 1877–78.

In this species the anterior part of the whorls is covered with granulose spirals, one more prominent than the rest in front of which the suture coils. The sinus is comparatively short with a polished flat fasciole bounded outside by an elevated strongly undulate keel, between which and the outer keel is a narrow deep sulcus with a row of faint nodules at the bottom. The spines are very small and curved toward the apex, the nucleus brownish, glassy, and unicarinate. There are indications of very faint axially directed flammules of pale yellow on the white surface.

Ancistrosyrinx radiata n. s.

Plate XII. Fig. 12.

Shell irregularly clouded with pale brown and white, or of a diffuse very pale brown; nucleus of two whorls, the first very small, rounded, obliquely set and partly immersed, arousing on casual inspection the unfounded suspicion that it is sinistral; apex sharp, the subsequent whorls (nine or ten) at first with a sharp dentate peripheral keel, which afterward becomes spinous and more or less posteriorly directed; spiral sculpture anteriorly of numerous rather widely separated fine threads, not granulose, but passing over rather coarse lines of growth and less crowded near the keel; carina with, on the tenth whorl, about twenty-six sharp short subtriangular spines more or less upturned; halfway between the keel and the carina is an elevated second keel, not undulate or dentate but much higher than in *A. elegans;* behind this is the sinus, which is indented about one eighth of a turn; the fasciole is concave; transverse sculpture of rather coarse prominent lines of growth which are often strongly marked; aperture narrow, elongate, notched for the sinus, the canal, and the carina; canal long, narrow, rather open, slightly curved at the tip; base of shell subconic, hardly rounded, whole surface of the shell having a polished appearance like barley-sugar candy. Lon. of shell, 18.0; of last whorl, 12.5; from the carina to the anterior end of the canal, 10.0; max. lat. of shell, 8.0; of aperture, 3.0 mm.

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* Since the above was written I have examined Reeve's type in the British Museum, and it proves to be a species of *Ancistrosyrinx*, but different from the East American forms.

Habitat. Yucatan Strait, 640 fms.; Station 132, in 115 fms., rocky bottom, off Santa Cruz; Station 143, in 150 fms., off Saba Bank; Station 220, in 116 fms., rocky bottom, off Santa Lucia; Station 206, in 170 fms., near Martinique, on a bottom of fine sand; Station 273, in 103 fms., coral, off Barbados; Station 290 (living), in 73 fms., coral, bottom temperature about 71° F.; Stations 296, 297, and 299, off Barbados, in 84–140 fms., hard or coral bottom. The Fish Commission obtained it in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys (dead), at Station 2373, in 25 fms., coral; and at Station 2646 (fresh), in 85 fms., sand, off Cape Florida.

The soft parts of this species are whitish or pale straw-color. The tentacles are small, the eyes large and black. The operculum, thin and yellow, resembles that of *Drillia.* The sides of the foot are plain, the gills as usual. The single living specimen, very small, was so far retracted that the shell had to be wholly sacrificed to get him out unlacerated. It was a male with a verge of proportionally enormous size set on the right side behind the head, smooth, somewhat sigmoid, with an oval tip, without any appendix, and slightly flattened.

This shell was at first confounded with *A. elegans,* but a comparison shows them to be perfectly distinct, the sculpture being entirely different. The present species, though not so slender, is more like *A. cedonulli,* Reeve, than is the *A. elegans,* the latter in several respects being nearer to the fossil species from the Mississippi Eocene.

Subgenus GENOTA H. & A. ADAMS.

Genota mitrella DALL.

Plate XII. Fig. 5.

Pleurotoma (Genota) mitrella Dall, Bull. M. C. Z., IX. p. 56, Aug. 12, 1881.
Pleurotoma (Genota) didyma Watson, Journ. Linn. Soc., XV. p. 404, Sept. 29, 1881; Chall. Gastr., p. 299, pl. xxii. fig. 5, 1885.

Habitat. Yucatan Strait, 640 fms.; off Sombrero, in 450 fms., ooze, Challenger Expedition.

No further specimens of this species have been found. It is referred to *Genota* on purely conchological grounds.

Section DOLICHOTOMA Bellardi.

Type, *Pleurotoma cataphracta* Brocchi.

The folds with which this species is credited are merely the projecting margin of the pillar, and an obscure thickening, hardly to be compared to a true plait.

Genota viabrunnea n. s.

Plate XIII. Fig. 8.

Shell solid, fusiform; with a smooth, brown, two-and-a-half-whorled vitreous nucleus, the last whorl of which has semilunar riblets; and eight slightly turrited whorls; spire short, conical, rather pointed; the early whorls delicately sculptured, the last two rather rude; the aperture longer than half the shell. Transverse sculpture in the earlier whorls (which are pure white) consisting of rather crowded flutings depending transversely forward from the sutural margin for a third of the width of the (visible) whorl, which then swells outward, marked by strong growth lines, to a series of peripheral angular nodulations which mark the course of the anal fasciole; on the fourth, fifth, and sixth whorls, counting from the nucleus, the flutings are more regular and elegant than in the earlier or subsequent turns, on the fifth and sixth they as well as the growth lines are elegantly granulose or marked with small round nodes, the resultant of transverse and spiral sculpture; the peripheral nodulations also become more transverse and divided into three smaller nodules each, from the same cause; on the seventh and eighth whorls the lines of growth become more rude, the flutings and nodulation gradually vanish, and the sculpture is reduced to obscure spiral ridges, finer and more uniform on and behind the fasciole, and coarser, with a certain alternation of larger and smaller in size, before the fasciole; the last three and a half whorls take on a warm brownish tint, the fasciole being a still darker and somewhat livid madder brown; the later spiral ridges are also often somewhat darker than their interspaces. Aperture narrow, canal short, broad, slightly recurved; outer lip produced in advance of the sinus, thin, simple, sharp; body polished, slightly excavated; column slightly twisted, swollen, white, smooth, attenuated in front, with no callus, as long as the canal; suture distinct, appressed, posterior surface of the whorls behind the fasciole somewhat concave. Lon. of shell, 38.00; of aperture, 22.00; max. lat. of shell, 16.5; of aperture, 6.5 mm.

Habitat. Off Martinique, at Station 211, in 357 fms., fine yellow sand, living; and near Barbados, at Station 295, in 180 fms., hard bottom; bottom temperature 50°.7 F. Also south of Cuba, in 254 fms., coral, at U. S. Fish Commission Station 2134.

This fine shell is of unusual solidity and warm coloration for a deep-water species. None of the specimens showed any indications of thickening or striation of the aperture. Like many others, in the present unsettled state of the classification of the *Pleurotomidæ*, its final place is somewhat uncertain, but

January 26, 1889.

conchologically it belongs with *Genota* as defined by Dr. Paul Fischer in his invaluable Manual.

The shell is closely allied to *Pleurotoma cataphracta* Brocchi, of the Miocene of the Paris and Vienna Basins. Though the sculpture differs in detail, and the fossil is more turrited, beside being sharply strongly internally lirate, the *G. viabrunnea* may be regarded as the descendant of the fossil in a more or less direct line. The several varieties even, so beautifully figured by Hoernes in his monograph of the Vienna Tertiary mollusks, are reproduced in the recent form. Among the five specimens I have seen there is a variation as to the sculpture which would divide them into two groups, just as Brocchi originally divided his *Murex cataphracta*. One has the spiral sculpture elegantly alternated, a stout thread and a slender one, all over the body, and all the threads minutely and prettily granulated. The other has the spiral sculpture ill-defined, sparser, rude, and obsolete, that on the base showing no granulations whatever.

Soft parts. The foot is double-edged in front, rounded at the corners and behind. It is nearly smooth, and like all the rest of the integument is yellowish white (in alcohol). The tentacles are rather long, cylindrical, stout, and not very pointed. The eyes are small, black, situated one third of the way from the base toward the tips of the tentacles. The verge is very large, recurved, flattened cylindrical, bluntly pointed; gills two, the lamellæ rather short, the organs themselves rather long and of a dark greenish color. The operculum normally is as in *Leucosyrinx*, thin, horny, elongated, pointed at the anterior end, which is the nucleus. The scar of attachment is large and curiously concentrically engraved, recalling the opercular scar in *Purpura*, though not rotary-concentric as that is.

In the Fish Commission specimens the operculum in each of three specimens was abnormal, being more or less truly concentric and smaller than it should have been. I suppose these specimens had lost the original operculum, and the subsequent product of the gland was deformed, as is known to happen occasionally in *Buccinum*. One of these specimens has a thickening on the pillar, like a clumsy reminiscence of a plait. I noticed that the upper coils of the soft parts appeared grooved when extracted, and, cutting into the spire of the specimen, found that the outer lip must have been internally lirate when the specimen was young, with some half-dozen obscure liræ. One of the specimens has obsolete liræ in the throat. They cannot be seen, but by rubbing the interior transversely with the point of a pin the invisible elevations can be *felt* as the pin point crosses them. It is possible that the species may be regularly lirate when perfectly adult, as in *G. cataphracta* Brocchi. The specimens indicate rather that the character referred to has become obsolete in the species, and only occasionally exists in special individuals.

The dentition I am unfortunately unable to describe. The soft parts within the mouth strongly recalled those of *Bela* as figured by Sars (Moll. Reg. Arct. Norv.); but the gland, which in that genus is supposed to secrete venom and which empties close to the radula, here seemed to enter the œsophagus some distance behind the proboscis, and I could not find any radular sac at the right side of the proboscis where it should be. On dissolving the whole buccal apparatus in boiling caustic potash, the residue afforded no trace of any teeth. Still I do not feel entirely confident that the animal is normally edentulous, or, if it is, that the gland in question is more than salivary. It would seem absurd that an edentulous mollusk should have a venom-gland. If it is edentulous, probably it is capable, in the fanged species, of producing a modified and poisonous secretion, while in others it is merely salivary.

A related species is *Genota atractoides* Watson, from the Philippines; it is lighter colored and the details of sculpture are different and stronger than in our species.

It will be observed that the soft parts are not like those of *Conus*. The soft parts of Adanson's *Genot* are not figured by him, nor described except by saying that they resemble those of the Cones. Unless *G. mitriformis* Wood, and *G. papalis* Reeve, Adams's types, be different from the present species, it is evident that *Genota* can rank only as a subdivision of *Pleurotoma*, and not as a genus by itself. If they do differ, the present forms must be separated as a subgenus of *Pleurotoma* under Bellardi's name.

Genus DRILLIA Gray.

The species of this group are so varied in their characters, and yet so closely connected by intermediate forms, that at present no absolute conclusions as to their arrangement can be drawn. I shall for convenience separate those here treated of into three groups: A, comprising those with rough sculpture, the spiral sculpture being present and usually emphasized; B, nearly smooth species with strong transverse ribs, and usually colored, the spiral sculpture faint or absent; and C, white, polished species, without spiral sculpture, and usually with the spire particularly long in comparison with the rest of the shell. These are deep-water forms, and shine with a peculiar lustre like rock candy. This is a character shared by several other groups of deep-water shells, and undoubtedly appears in response to some unknown factor in the environment.

Section A. *Roughly sculptured species.*

Drillia ostrearum Stearns.

Drillia ostrearum Stearns, Proc. Bost. Soc. Nat. Hist., XV. p. 22, 1872. Tryon, Man., VI. p. 197, pl. xxxiv. fig. 79, 1884.

Habitat. Off Sombrero, in 54–72 fms.; Station 142, Flannagan's Passage, in 27 fms.; Station 247, near Grenada, in 170 fms.; Station 272, in 76 fms., off Barbados. Living, in 15 fms. to low-water mark, from Cape Hatteras to Cape

Florida, and westward to Cape Catoche, Yucatan, U. S. Fish Commission, and other authorities.

The deep-water specimens of this species are all dead, and I believe them to be adventitious.

Drillia Tryonii n. s.

Shell recalling *D. ostrearum*, but white, more acutely pointed, smaller, with a more gibbous varix in the adult, an umbilical chink on the pillar, and a spirally threaded fasciole instead of a smooth one; shell eight-whorled, with a smooth nucleus; 16–18 long transverse ribs extending across the whorls, fasciole and all; crossed by numerous (eleven on the last whorl but one) elevated, even, rounded threads, with about equal or wider interspaces; the threads are not swollen at the intersections; suture distinct, the fasciole but slightly excavated, whorls moderately rounded; on the last whorl, a quarter of a turn before the adult aperture is formed, is a prominent swollen rounded varix, or rib; aperture short; body callous; pillar reflected, forming a distinct pseudo-umbilicus; outer lip thin, not lirate, strongly arched; canal short, curved. Lon. of shell, 12.0; of last whorl, 7.0; of aperture, 5.2; max. lat. of shell, 4.3 mm.

Habitat. Station 231, near St. Vincent, in 95 fms.; Station 262, near Grenada, in 92 fms.; Station 272, near Barbados, in 76–100 fms.

I regard this as a shallow-water species, adventitious in the above localities. All the specimens are injured, but from the lot a description was practicable. These shells, by some error of observation, were returned to me as a variety of *D. ostrearum* by Mr. Tryon. They are a well marked and perfectly distinct form, having only the most general resemblance to *D. ostrearum*. The average dimensions of the latter, from the same region, are, lon. of shell, 17.0; of last whorl, 10.0; of aperture, 7.5; max. lat. of shell, 7.0 mm.

The nearest relative among the Blake shells to this form is *D. albicoma*, from which *D. Tryoni* will be distinguished by its smaller size, its more numerous and close-set ribs, and by its strongly differentiated fasciole.

Drillia albicoma n. s.

Plate X. Fig. 8.

Shell solid, slender, acute, pure white, with a simple polished nucleus of a whorl and a half, followed by nine normal whorls; spiral sculpture of extremely fine, close-set, regular threads, uniform over the entire surface, but scarcely visibly developed in the first four whorls, which appear polished to the naked eye; the threads on the last whorl are about nine in the breadth of a millimeter; transverse sculpture of rather stout, sharp ribs (on the seventh whorl ten) which extend from suture to suture, with a slight flexuosity near the suture, but no marked interruption for a fasciole; on the last whorl there are fourteen of these ribs, beside the large shouldered varix behind the aperture; they extend well over the periphery of the whorl, and are evanescent on the canal; other transverse sculpture comprises only fine lines of growth which are not parallel to but more oblique than the aforesaid ribs, and reticulate prettily the spiral threads; whorls but little inflated, having a very regular taper, slightly appressed at the distinct but not deep suture; aperture more than one third as long as the shell, polished within, with a deep broad notch, slightly in advance of the suture, whose edges are produced and considerably reflected; the fasciole is indistinct and little depressed; the outer lip smooth, in the middle produced, internally somewhat thickened, not lirate; canal short, rather broad, somewhat recurved; a broad, not very thick, continuous band of white callus from the end of the pillar over the body passes into the reflected margin of the notch; pillar slightly curved. Lon. of shell, 25.7; of last whorl, 10.6; of aperture, 9.0; lat. of last whorl, 8.0 mm.

Habitat. This shell came to me, labelled Station 36, 84 fms.; that is, in the Gulf of Mexico, Lat. 23° 13′ and Lon. 89° 16′ W.; bottom temperature, 60° F. But the facies of the shell is that of deep, or at least of cooler water, and I suspect some error has occurred. Perhaps it might have remained in the dredge from the immediately preceding haul from 804 fms.

Fragments have since turned up, in material dredged in 100 fms., at Barbados, by the Hassler expedition. This would tend to confirm the correctness of the original label. Another fragment was dredged in 101 fms., at Station 45.

The species is very elegant in its slender taper and snowy whiteness.

Drillia ? detecta Dall.

Plate XII. Fig. 11.

Pleurotoma (*Drillia*) *detecta* Dall, Bull. M. C. Z., IX. p. 65, August, 1881.
Pleurotoma (*Defrancia*) *circumvoluta* Watson, Journ. Linn. Soc., XV. p. 465, Nov., 1881.
Clathurella circumvoluta Watson, Rep. Chall. Gastr., p. 357, pl. xxi. fig. 1, 1885.

Habitat. Station 43, in 339 fms., Gulf of Mexico. Off Culebra Island, in 390 fms., mud, Challenger expedition.

Mr. Watson's figure represents an immature shell, slightly more slender than my type of *detecta*. It is quite likely that he may be right in his generic reference, as my specimen does not show the *Drillia* varix, yet its form and short last whorl seem to me more like that of a *Drillia* than any other group. The Blake specimen was dead and lustreless.

Drillia alesidota n. s.

Shell large, slender, ashy brown or light brown, pointed, rudely sculptured, ten-whorled, with a nucleus of about two whorls, round, small, glassy, smooth and inflated; fasciole slightly concave, nearly smooth, very steep, separated from the suture by a smoothish space, marginated by a slightly raised thread; suture appressed; spiral sculpture of numerous subequal little elevated revolving threads with wider interspaces; they are strongest on the summit of the riblets, faint in the interspaces; there are about five in front of the fasciole and between it and the next suture; they are fainter on the canal; transverse sculpture of numerous (on the penultimate whorl 28) narrow, little elevated, slightly oblique riblets, beginning and strongest at the fasciole, and passing over the whorl to fade away on the base; the thin margin of the suture is sometimes undulated by passing over them; aperture narrow, long, notch rounded, not deep; outer lip simple, thin, arched forward, not constricted for the canal; inner lip simple with a slight callus, thicker at the posterior angle opposite the notch; pillar straight, attenuated and somewhat twisted in front, canal wide, slightly recurved. Max. lon. of shell, 48.0; of last whorl, 26.5; of aperture, 21.0; lat. of shell, 12.0 mm.

Drillia alesidota var. macilenta Dall.

Plate XXXVI. Fig. 1.

Shell more slender, the sculpture more elegant, the spiral element proportionally stronger, existing on the fasciole and canal, as well as over the rest of the surface. Lon. of shell, 36.5; of last whorl, 20.0; of aperture, 15.0; lat. of shell, 8.2 mm.

Habitat of type form. Off Cape Hatteras, N. C., in 63 to 107 fms., sand, temperature 67°.0 to 75°.0 F., at Stations 2595 and 2601 of the U. S. Fish Commission.

Habitat of var. *macilenta.* U. S. Fish Commission Station 2417, in 95 fms., sand, 52 miles S. E. of Cape Fear, N. C., temperature 66° F. Station 2402, in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Florida, in 111 fms., mud. Blake expedition, Station 273, in 103 fms., sand, Barbados, temperature 59°.5 F.

This is a very plain, simple-looking species of a dull color. It is quite large, but appears not to have been heretofore described or figured.

Drillia polytorta Dall.

Plate X. Fig. 6.

Pleurotoma (*Drillia*) *polytorta* Dall, Bull. M. C. Z., IX. p. 61, August, 1881.

Habitat. Off Cape San Antonio, 413 fms.

This species has much such a sculpture as the last, except that the ribs are larger, rounder, and fewer, the whorls shorter, more numerous, and more inflated.

Drillia eucosmia n. s.

Plate XIII. Fig. 1.

Shell pale, with touches of pale brown and a peripheral whitish zone, eight-whorled, with a glossy, rounded nucleus of two whorls; fasciole rather wide, excavated, undulating in harmony with the ribs, marked by fine revolving threads and marginated at the appressed suture by a stout elevated line; spiral sculpture on the rest of the shell (1) of (on the whorls preceding the last) two or three prominent white stout threads, somewhat swollen where they ride over the ribs; on the last whorl there are about fifteen of these primary spirals; between the fasciole and the end of the canal, in each of the wide interspaces, are (2) three or four much finer hardly elevated flattish threads, similar to those on the fasciole, and on the last whorl the marginating thread behind the fasciole is wider and somewhat crenulated; transverse sculpture of (on the penultimate whorl 9) stout, rounded ribs, beginning at the fasciole and obsolete on the canal; beside these there are only incremental lines; the brown touches are on these ribs above and below the white zone, which is bounded by the peripheral pair of primary spirals; final varix stout and rounded; aperture narrow, notch rounded, strongly marked; outer lip thin, arched forward, not lirate within; a single internal thread runs parallel with the fasciole deeper in the throat; inner lip with a thin callus with elevated margin; pillar straight, canal short, obliquely truncate, rather wide. Max. lat. of shell, 6.4; lon. of shell, 19.0; of last whorl, 10.3; of aperture, 7.7 mm.

Habitat. Station 247, near Grenada, in 170 fms., ooze, temperature 53°.5 F.

Drillia eucosmia var. canna Dall.

Shell smaller, more slender; the peripheral primary spirals always three; the secondary spirals few or obsolete; ribs six or seven, rather more prominent. Lon. of shell, 15.25; lat. of shell, 6.0 mm.

Habitat. With the last. Also west of Florida, in 50 fms., Gulf of Mexico; and off Cape Lookout, N. C., in 52 fms., sand, at Station 2612, by the U. S. Fish Commission.

This very elegant little species belongs to a group of several, which possess characters in common, and which appear to be undescribed.

Drillia haliostrephis n. s.

Plate XIII. fig. 3.

Shell pure white, eight-whorled, with a glossy rounded vitreous nucleus of two whorls; spiral sculpture much as in *D. eucosmia*, a line marginating the suture; two or three strong primaries on the upper whorls, five or six on the body whorl, and eight or ten smaller ones on the canal; the principal primaries are strongly marked and slightly swollen on the summits of the ribs; the secondary spirals, very faint or absent behind the periphery but present in the interspaces in front of it, are finer than in the last species, and more numerous; the fasciole is wide, nearly smooth, undulated, and little excavated; the aperture is narrow and long, the notch shallow, the interior not lirate, the inner lip simple with a thin callus, the canal wide, straight, rather long; the ribs are seven on the penultimate whorl, narrower and less prominent, as is the varix, than in the last species. Lon. of shell, 19.5; of last whorl, 11.0; of aperture, 8.0; max. lat. of shell, 5.5 mm.

Habitat. Gulf of Mexico, at Station 36, in 84 fms.

This shell is more slender, the primary spirals stronger, the other sculpture weaker, than in *D. eucosmia*. The color is also different. In the variety *canna* the last whorl is stouter in proportion to the spire than in this species.

Drillia acestra n. s.

Plate X. fig. 7.

Shell long, slender, pale olive-color with a translucent white tip, nine-whorled, with a smooth vitreous rounded two-whorled nucleus; fasciole wide, steep, excavated, marked with close-set fine even spirals; it is bounded behind by a sharply cut elevated thread, a little space in front of the suture; the whorl in front of the fasciole is covered with close-set, strong, subequal, flattish spirals, with narrow channelled interspaces; these spirals, from two on the four apical whorls, increase to seven on the penultimate whorl, and eleven (behind those on the canal) on the last whorl; here they are a little more widely separated, and have one or two intercalary fine threads in the interspaces; on the canal there are six primary threads alternating with somewhat smaller secondary ones; transverse sculpture of gently elevated ribs (eight on the penultimate whorl), which vary in different specimens as to elevation and strength; in the type specimen figured they begin at the fasciole and fade on the base; the varix is strong and protrudes, there is a touch of livid color in front of it, which is seen nowhere else on the shell; aperture whitish, throat slightly livid, not lirate; notch deep and strong, outer lip thin, contracted for the canal; inner lip with a thin elevated callus, pillar straight, canal rather short, recurved. Max. lon. of shell, 19.0; of last whorl, 9.8; of aperture, 7.0; max. lat. of shell, 5.5 mm.

Habitat. Station 101, off Havana, in 400 fms. Variety (?), Station 248, near Grenada, in 161 fms.

The specimen I have referred to as a variety may be distinct; it has twelve ribs, a narrower and less marked fasciole, and the spiral sculpture is much less elevated and sharp. But the general aspect is so similar that I dare not separate them without a larger series of specimens.

Drillia pharcida Dall.

Plate XII. fig. 2.

Pleurotoma (*Drillia*) *exasperata* Dall, Bull. M. C. Z., IX. p. 63, August, 1881. Not of Reeve, 1843.

Habitat. Off Cape San Antonio, 1002 fms.; Station 5, in 229 fms., Gulf of Mexico; Barbados, 100 fms.

The specific name having been used by Reeve for a species conchologically related to *Drillia*, I am obliged to substitute another name for the one at first adopted.

This species was dredged by Dr. Rush, in 150–200 fms., off the Fowey rocks, Florida Strait.

Drillia acrybia n. s.

Shell closely related to *D. pharcida* with which it may advantageously be compared. The most obvious differences are, that in *D. pharcida* the ribs and their intersecting sharp spirals are as strong on the last whorl as on the others, in *D. acrybia* the ribs on the last whorl are obsolete and the spirals fainter; the spire of *D. acrybia* is shorter in proportion to the last whorl, the canal is longer, there is one less whorl in the adult shell, the fasciole is less excavated, the suture more appressed, and consequently less evident. In all other respects the shells closely resemble one another. Lon. of shell, 10.0; of last whorl, 6.0; of aperture, 4.0; max. lat. of shell, 4.0 mm. The same measurements in *D. pharcida*, of the same maturity, are, lon. of shell, 11.75; of last whorl, 6.25; of aperture, 4.5; max. lat. of shell, 4.0 mm.

Habitat. U. S. Fish Commission Station 2668, in 294 fms., sand, off Fernandina, Florida, temperature 46°.3. Also in 136 fms., off the coast of Florida, Dr. W. H. Rush.

It is quite possible that the remarkable variability which I have so often referred to among the deep-sea shells may have been operating here, and that these shells are merely an extreme variety of *D. pharcida*. I have not material enough to prove this. But if the two shells were dredged from shallow water, they would not, I think, be questioned as distinct species by any one who carefully studied them.

Drillia tristicha n. s.

Shell white, elongated, acute, with a rounded vitreous white two-whorled nucleus and nine succeeding whorls; spiral sculpture of three principal strong threads, enlarged where they pass over the ribs, four more on the base of the last whorl, about eight somewhat weaker ones on the canal, and a single one in front of and marginating the suture; the interspaces are wide, and upon them and over the fasciole are wound numerous fine, sharp, undulating, secondary spiral threads; all these cross (on the penultimate whorl) fourteen even, rounded, narrow riblets, with narrower interspaces, which start at the anterior edge of the fasciole, cross the whorl, and fail on the canal; suture distinct, wavy; fasciole obscure, not excavated; whorls rounded; varix stout, thick, and rounded; aperture narrow, notch strongly marked, round; outer lip thin, without liræ; inner lip with a thin, smooth, elevated callus; canal distinct, rather long and narrow, not recurved; pillar straight. Lon. of shell, 23.0; of last whorl, 12.5; of aperture, 9.7; max. lat. of shell, 5.5 mm.

Habitat. Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Florida, at U. S. Fish Commission Stations 2377, 2399, and 2402, in 210, 196, and 111 fms., mud, temperature 52° to 67° F.

B. *Nearly smooth ribbed species.*

Drillia ebur Reeve.

Pleurotoma ebur Reeve, P. Z. S., 1845, p. 116; Conch. Icon., pl. xxx. fig. 275, Dec., 1845.

Clavus ebur Tryon, Man., VI. p. 188, pl. xiii. fig. 56.

Habitat. Cape Hatteras to Florida, living, in 14 to 50 fms. Also at Station 10, Gulf of Mexico, in 34 fms.; Station 22, in 95 fms.; Station 36, in 84 fms.; off Sombrero, in 54 fms.; all specimens dead.

These shells were probably adventitious in the localities where found by the Blake, having perhaps been disgorged by fishes.

This species forms a sort of transition to the preceding section. The nucleus is peculiar in being almost entirely sculptured with strong radiating riblets, and a little later with close-set fine spirals. This character varies somewhat in strength, but is sufficiently well marked in all the specimens I have examined to be regarded as characteristic of the species as far as known.

Drillia fucata Reeve.

Pleurotoma fucata Reeve, P. Z. S. 1845, p. 110; Conch. Icon., fig. 169.

Pleurotoma paria Reeve, Conch. Icon., fig. 334, Jan., 1846.

Habitat. Coast of North Carolina, off Cape Fear, in 14 fms., sand, to St. Thomas and Haiti.

This is the variety with numerous (about 16) ribs, which is the typical form. This species in all its forms is larger than *D. ebur* Reeve, and has the usual smooth, vitreous *Drillia* nucleus; it is proportionally shorter and has the last whorl stouter than any of its near connections. It is covered with fine spiral threading, which in well developed specimens is beautifully reticulated by very close, fine, sharp, elevated incremental lines, visible in the interspaces. The number and stoutness of the ribs varies greatly. There are specimens without any ribs; I have one from Samana Bay, Santo Domingo. The variety *paria* Reeve has six or eight ribs, is pale colored, and ranges from the West Indies to Cape Fear, North Carolina.

Drillia pagodula n. s.

Plate XIII. Fig. 6.

Shell resembling *D. fucata,* but much more slender, the fasciole less impressed, the spiral sculpture of fine engraved lines and the aperture smaller and much more narrow. Nucleus glassy, rounded, two-whorled; shell with eight or nine strongly ribbed whorls; spiral sculpture, sometimes obsolete near the suture, of extremely fine, wavy, close-set, incised lines; transverse sculpture of (on the penultimate whorl 9 to 11) nearly straight stout ribs extending from the suture over the periphery and lost on the base; fasciole not well marked; suture distinct, somewhat appressed, undulated by passing over the ribs; surface more or less lustrous; color white, spirally banded with rich yellow brown, sometimes on the periphery, sometimes on the base, etc., but the fasciole is usually white and the ribs are apt to show white, wholly or in part on the yellow, when present. Aperture short, narrow, with hardly any canal; notch large and deeper than wide; outer lip thin, not internally lirate; throat white; inner lip a little callous; pillar short, simple; canal very short, not differentiated from the aperture; varix stout and prominent. Max. lon. of shell, 18.0; of last whorl, 9.0; of aperture, 6.3; max. lat. of shell, 5.8 mm.

Habitat. West of Florida, in 50 fms.; off Havana, Sigsbee, in 119–175 fms.; Station 177, in 118 fms., sand, off Dominica, temperature 65°.0; Stations 273, 282, and 290, near Barbados, in 73 to 154 fms., coral and sand, temperature 56° to 71° F.

This species may be pure white, banded with yellow brown or spotted between the ribs with pink or brown.

A young shell, similar to the above but stouter, with the tip white, the whorls whitish and the summits of the five ribs brownish, was dredged by the Fish Commission in 49 fms., off Cape Hatteras, N. C. The ribs are continuous from base to summit and the cross-section of the shell forms an exact pentagon with rounded angles. The ribs are not continuous, except accidentally, in those previously described; but this may perhaps be an extreme variety (for which the name *pentagonalis* may be used) of *D. pagodula.* The indications are that it is the young of a distinct species. Lon. of shell, 7.0; of last whorl (there are four beside the nucleus), 5.0; max. lat. of shell, 3.0 mm. There are two similar specimens. The *Mangilia pentagonalis* (Gray) Reeve is a smaller and much more slender shell.

Drillia coccinata Reeve.

Pleurotoma coccinata Reeve, P. Z. S., 1845, p. 118; Conch. Icon. sp. 299, Dec., 1845.

Habitat. Station 128, off Santa Cruz, in 180 fms.; Station 272, in 76 fms., Barbados. Living, in 16 fms., Samana Bay, Santo Domingo, Couthouy.

The shell varies from white to brown or rose-pink, and may be stout or slender, with 8 or 10 ribs on the last whorl. The fasciole is always well excavated and smooth.

Drillia thea var. **carminura** Dall.

Drillia thea Dall, Proc. U. S. Nat. Mus., VI. p. 328, pl. x. fig. 5, Dec., 1883.

Habitat. Barbados, 100 fms. Coasts of Florida, Dall, Hemphill, and Dr. Rush.

Since the original dusky type was described, the color of wet tea leaves, Hemphill has sent a paler variety with a narrow peripheral brown band. This was found at Cedar Keys, and by Dr. Rush also at Turtle Harbor. A still paler form without any band was dredged by the U. S. Fish Commission in 111 fms., in the Gulf of Mexico, at Station 2402. In this specimen the nucleus was of a lovely bright carmine color. This form, which is probably peculiar to deep water, may take the varietal name of *carminura*. It has seven whorls beside the nucleus, of a lemonade color, with nine ribs on the penultimate whorl, rather straighter than in the type and less swollen on the periphery. Lon. 11.5, lat. 4.0 mm. The Barbados specimens appear to be of the same sort, but are dead and faded.

Drillia? Simpsoni Dall.

Pleurotoma (*Mangilia*?) *Simpsoni* Dall, Proc. Davenport Acad. Sciences, V. p. 54, Nov., 1887.

Habitat. U. S. Fish Commission Stations 2607 and 2619, off the coast of North Carolina, in 15 to 18 fms., sand, fifteen to twenty-five miles off shore. Tampa Bay, Florida, Simpson.

Fragments of this pretty little species and a nearly adult specimen were obtained as above, thus greatly increasing its known geographical range. Its genus is still uncertain, but I think, in my second specimen, through the translucent shell, I can distinguish an operculum attached to the dried animal.

Drillia lissotropis Dall.

Plate XI. Figs. 3, 4.

Pleurotoma (*Mangilia*) *lissotropis* Dall, Bull. M. C. Z., IX. p. 58, August, 1881.
? *Pleurotoma* (*Mangelia*) *hypsela* Watson, Journ. Linn. Soc., XV. p. 433, Oct., 1881. Chall. Gastr., p. 341, pl. xxi. fig. 4, 1885.

Habitat. Station 20, 220 fms., Gulf of Mexico; off Havana, in 127 fms.; Station 273, near Barbados, in 103 fms.; Stations 282 and 290, off Barbados, in 154 and 73 fms., coral; Station 134, near Santa Cruz, in 248 fms., coarse sand. Range of temperatures, 54°.5 to 71° F.

Mr. Watson's specimen is not sufficiently perfect to decide with certainty, but it looks very much like the present species. The examination of better material since the first description was made shows this species to have the regular *Drillia* aperture and nucleus, and it is therefore referred to that genus. The curvature and number of the ribs vary slightly, and the spaces between are indifferently perfectly smooth, or finely spirally striate, especially toward the anterior end of the shell.

This species differs from *D. Verrillii*, with which it has many points in common, in the absence of the angulation of the ribs at the periphery, the longer and more slender form of both shell and riblets, and in *D. Verrillii* the absence of any spiral sculpture except the fasciole and a few coarse threads on the canal. These shells are so very small and polished that it is extremely difficult for an artist in pure line-work to represent them adequately. Only lithography with its delicate mutations of shade can do it properly. For this reason our figures of this species and *D. Verrillii* are less satisfactory than most of these which represent rougher and larger shells.

Drillia? Dalli VERRILL.

Pleurotoma Dalli Verrill, Trans. Conn. Acad.,V p. 451, pl. lvii. figs. 1, 1a, April, 1882.

Habitat. Variety *acloneta*, Station 206, near Martinique, in 170 fms., fine sand, temperature 49° F. ; U. S. Fish Commission Station 2668, in 294 fms., gray sand, off Fernandina, Fla., temperature 46°.3. Variety *cestrota*, Station 2399, in 196 fms., mud, in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Fla., temperature 51°.6. Typical form, off Martha's Vineyard, in 94 to 143 fms., and off Delaware Bay, in 104 fms.

This species, recognizable by its large blunt tip and brownish livid streaks or tint, is notably variable. The type is obscurely ribbed; on the upper whorls the ribs are a little stronger. The variety which I have called *acloneta* is totally without ribs, and for this reason the fasciole is less apparent. The variety *cestrota*, on the other hand, has the ribs much stronger than in the typical form, and closer set; they even undulate the fasciole a little. The three forms of this species, with their connecting varieties, illustrate in a characteristic manner the mutability of these archibenthal species.

Drillia nucleata DALL.

Plate XI. Fig. 1.

Pleurotoma (Drillia) nucleata Dall, Bull. M. C. Z., IX. p. 62, Aug. 12, 1881.
? *Pleurotoma (Drillia) amblia* Watson, Journ. Linn. Soc., XVI. p. 249, March, 1882.
? *Clionella amblia* Watson, Chall. Gastr., p. 373, pl. xxii. fig. 12, 1885.

Habitat. Gulf of Mexico, Station 5, in 229 fms., and Station 43, in 339 fms. Antilles, off Sombrero, in 54 fms., and Station 230, off St. Vincent, in 464 fms., ooze. U. S. Fish Commission Station 2644, off Cape Florida, in 193 fms., sand, temperature 43°.4 F. ? Challenger expedition, off Culebra Island, in 390 fms., ooze.

It would seem, from the figure of Mr. Watson's imperfect type specimen, as if it must approach very closely to one of the varieties probably of *D. nucleata*, or possibly of *D. Dalli*.

There are, however, in the Fish Commission dredgings, half a dozen extremely puzzling forms of this general character, which further study and material are needed to elucidate.

Drillia Verrillii Dall.

Plate XI. Fig. 2.

Pleurotoma (Drillia) Verrillii Dall, Bull. M. C. Z., IX. p. 68, August, 1881.

Habitat. Station 19, 310 fms.; Station 20, in 220 fms.; both in the Gulf of Mexico.

This small, but very elegant species, is referred to under the head of *D. lissotropis*, to which it is related. It differs in its smaller size, shorter whorls, absence of fine spiral striæ, and in the short stout ribs, swollen and angulated at the periphery.

Drillia havanensis Dall.

Plate XI. Fig. 5.

Pleurotoma (Drillia) havanensis Dall, Bull. M. C. Z., IX. p. 67, August, 1881.

Habitat. Station 16, 262 fms.; Station 19, 310 fms.; Sigsbee, off Havana, 450 fms.; Yucatan Strait, 640 fms.

No more specimens of this species have been found in the collection. *Clionella aglaophanes* Watson should be compared with it.

Drillia premorra n. s.

Plate XI. Fig. 18.

Shell waxen white, with a vitreous white smooth rounded nucleus of nearly two whorls and eight subsequent sculptured whorls. Spiral sculpture of an undulated more or less nodulous narrow band in front of the suture, separated by the fasciole from an angulation, which in the upper whorls is peripheral, and on the last whorl forms a well marked shoulder; in front of this on the upper whorls are one to three, and on the last whorl between the angle and the anterior end of the canal about a dozen, small sharply elevated threads with much wider interspaces, threads which are, where they intersect the transverse ridges, modified by small sharp nodulations. Transverse sculpture of (on the last whorl 14 to 18) sharp-edged low narrow oblique strongly bent ridges rather than ribs, evanescent on the base and fasciole, but corresponding to the elevations on the presutural band; these are proportionally stronger and more prominent near the apex, and become obsolete on the last part of the last whorl; suture distinct; whorls moderately full; base subconic, slightly constricted for the short canal; incremental lines distinct, stronger on the last whorl; fasciole somewhat excavated, smooth except for the curved incremental lines; surface of the shell rather vitreous; aperture of the (not adult) shell rather wide; anal notch wide, rather shallow; outer lip arched; canal hardly differentiated, short, narrow; pillar straight, anteriorly attenuated. Max. lon. of shell, 9.5; of last whorl, 5.2; of aperture (not quite adult), 3.5; max. lat. of shell, 3.5 mm.

Habitat. Gulf of Mexico, at Station 100, off Morro Light, in 400 fms.

This, after thorough study, seems distinct from any described form, and, though not adult, is without doubt a *Drillia.* Specimens on which the transverse sculpture is exceptionally strong have a somewhat different aspect, and are rougher than the one figured. The sculpture is sharp, and the angle of the bent ridges is peculiarly abrupt. The surface is not shagreened, though the aspect of the shell recalls that of some of the shagreened Mangilias.

C. *Shells smooth, vitreous.*

Drillia oleacina DALL.

Plate XI. Fig. 8.

Pleurotoma (Drillia) oleacina Dall, Bull. M. C. Z, IX. p. 66, August, 1881.

Habitat. Gulf of Mexico, at Station 21, in 287 fms., and off Morro Light, Havana, in 292 fms. Antilles, Station 261, near Grenada, in 340 fms.

The most perfect specimens of this form under magnification show fine spiral incised lines over the last whorl, but to the naked eye the vitreous glistening surface appears perfectly polished. It is possible that these species would belong to the group of *Spirotropis,* to which similar shells have been referred, but it is hardly worth while to put them there until the dentition is known.

Drillia smirna DALL.

Plate XI. Fig. 7.

Pleurotoma (Drillia) smirna Dall, Bull. M. C. Z., IX. p. 66, August, 1881.

Habitat. Gulf of Mexico, off Cape San Antonio, 413 fms., and Station 100, off Morro Light, Havana, in 400 fms. Also at U. S. Fish Commission Station 2150, near Old Providence, W. I., in 382 fms., ooze, temperature 46°.0 F.

With the exception of the type, the specimens found so far are all quite young.

Drillia lithocolleta Watson.

Plate XI. Fig. 6.

Pleurotoma (*Typhlomangelia*) *lithocolleta* Watson, Journ. Linn. Soc., XV. p. 441, Oct., 1881. Chall. Gastr., p. 320, pl. xxiv. fig. 6, 1885.

Habitat. Station 163, near Guadelupe, in 769 fms., sand, temperature 39°.75 F. Also at U. S. Fish Commission Station 2384, in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Florida, in 940 fms., mud; Stations 2676 and 2677, off Cape Fear, North Carolina, in 407 and 478 fms., mud and sand, temperature 39° to 46° F. Off Sombrero, in 450 fms., ooze, Challenger Expedition.

This very beautiful species, of which some specimens reach a length of 27.0 mm., seems to have a wide distribution. The operculum is rather thin and wide, shaped like that of *Drillia*. The specimen figured, the only one collected by the Blake, is immature. Subsequently, the Fish Commission sent in much finer specimens. The larger ones show a tendency to a flesh or salmon tint in the columellar region.

Section CYMATOSYRINX Dall.

We now come to a group of Drillias which have a family resemblance to *Pleurotoma lunata* Lea, of the Miocene of Virginia, and are doubtless derived from the same stock. That species, of which the type is before me as I write, is larger, stouter, and finer in development than any of its recent relatives, but there is a singularly uniform facies to them all. *D. pallida* Sowerby, from the west coast of America at Panama, is apparently to be included in the same group. For these, should a sectional name be required, since they are distinctly not typical species of *Crassispira*, the name *Cymatosyrinx* might be applied. The type would be Lea's species above referred to.

Drillia? centimata n. s.

Plate XXXVI. Fig. 9.

Shell pure white, with a pointed turrited spire, a brownish glossy rounded nucleus of two and a half whorls, and nine or ten subsequent whorls; fasciole wide, sloping, reaching to the somewhat appressed suture, smooth except for the deeply arched incremental lines; transverse sculpture, aside from lines of growth, of thirteen or fourteen peripheral nodules, well elevated, and on the last whorl somewhat elongated and obliquely set; there is no spiral sculpture even on the canal; the fasciole is so wide, and the whorls increase so rapidly, that the shell has a peculiarly conical aspect; base moderately rounded; aperture moderately wide, with a very wide and deep anal notch, and the outer lip correspondingly curved forward, arched, and thin; inner lip with a moderate callus; pillar simple, slender, much twisted, the canal short, rather wide, and flaring a little at the end. Max. lon. of shell, 22.5; of last whorl, 12.5; of aperture, including the canal, 9.5; max. lat. of shell, 9.0 mm. There is no varix behind the aperture.

Habitat. Station 31, in the Gulf of Mexico, in 1920 fms., lat. 24° 33′, lon. 84° 23′ W., temperature 39°.5. U. S. Fish Commission Station 2383, between the delta of the Mississippi and Cedar Keys, Florida, in 1181 fms., mud; Station 2678, off Cape Fear, North Carolina, in 731 fms., ooze, temperature 38°.7 F.

This fine but rather rude-looking species is particularly characterized by the prominence of its nodules, and the long slope back from them to the suture, and its pointed spire. The absence of the varix suggests that it may eventually prove not to be a *Drillia;* the soft parts in our specimens having contracted so far into the spire as to be inaccessible.

Drillia æpynota n. s.

Plate XXXVI. Fig. 10.

Shell short, stout, with a smooth rounded whitish inflated nucleus of two whorls and eight subsequent whorls; color whitish or pale madder brown; spiral sculpture of obsolete spiral striæ, generally a little wavy, and often absent from a part or the whole of the shell; they are strongest on the base, but are generally so faint as not to interrupt the apparent smoothness of the surface nor to be perceptible without a lens; suture appressed, undulated over the ribs; fasciole narrow, excavated, smooth except for lines of growth and the undulations due to the ribbing; transverse sculpture of rather faint growth lines and of (on the last whorl 12) strong, stout rounded ribs, strongest in front of the fasciole where they end bluntly, extending across the whorl and disappearing only on the canal; the interspaces are about equal to the ribs, which are slightly obliquely set; varix large, stout, simple; outer lip in front of it thin, arched, not internally lirate; aperture rather narrow; notch subcircular; inner lip and pillar with an elevated rather thick callus; pillar concave; canal short, distinct, deep, curved to the right in the adult; siphonal fasciole distinct. Max. lon. of shell, 15.5; of last whorl, 8.75; of aperture, 5.5; max. lat. of shell, 6.2 mm.

Habitat. Off Cape Hatteras, N. C., at U. S. Fish Commission Stations 2592, 2595, 2600, 2601, 2602, and 2606, in from 25 to 120 fms., mud and sand, temperature ranging from 58° to 77° F.

This strongly marked little species may be readily distinguished from *D. ebur* Reeve, found with it, and of somewhat similar appearance, by the absence of the spiral threads, the more prominent whorls, the stouter ribs, and the more deeply excavated suture. It is a miniature edition of *D. lunata* Lea.

February 11, 1889.

Drillia Moseri n. s.

Plate XXXVI. Fig. 3.

Shell varying from a rich rose color, with paler bands on the base, fasciole, etc., to yellowish white; nucleus as usual in *Drillia* with two whorls followed by nine or ten subsequent whorls; spiral sculpture of numerous very shallow grooves with wider flat interspaces; the grooves are cross-striated by close-set fine elevated incremental lines; this sculpture is very easily eroded and sometimes nearly absent; transverse sculpture of about eleven strong wave-like ribs with wider interspaces, the crests rounded; these extend from the suture to the base, and are narrowed and curved like the top of an interrogation point when they pass over the fasciole; the fasciole is constricted rather than excavated, the grooving is closer and finer than on the rest of the shell, and if the shell is colored the fasciole is paler; the whorl is strongly appressed at the suture and a little undulated by the ribs; the aperture is rather narrow; the notch large and rounded; the callus thick and elevated, the pillar nearly straight; the canal short, wide, turned to the right, the siphonal fasciole strong; the varix large and stout. Max. lon. of shell, 30.0; of last whorl, 15.5; of aperture, 11.0; max. lat. of shell, 10.0 mm.

Habitat. West of Florida, in 15 fms.; St. Martin's Reef, South Florida, in 3 fms., Lieut. J. F. Moser, U. S. N.; Sarasota Bay, one specimen, H. Hemphill; U. S. Fish Commission Station 2596, 17 miles E. S. E. of Cape Hatteras, N. C., in 49 fms., sand, temperature 75° F.

This shell, when pink, is one of the prettiest of the small shells on our southeastern coast. It is respectfully dedicated to Lieut. Moser, whose collections while engaged on surveys in Florida often contributed material of much interest for the study of the Floridian marine fauna.

Genus BORSONIA Bellardi.

Borsonia Bellardi, Bull. Soc. Géol. de France, X. p. 30, 1838. Mon. Pleurotome del Piemonte, p. 83, tav. iv. fig. 13 (*B. prima* Bell.), 1847.

Shell pleurotomoid, with a single plication of the columella near the middle of the inner lip.

Subgenus BORSONIA s. s.

Borsonia ceroplasta and *B. sericea* Watson, the former from 390 fms., mud, near Culebra Island, and the other from off Pernambuco, in 350 fms., red mud, belong to the typical section of the genus.

Subgenus CORDIERIA Rouault.

Cordieria Rouault, Bull. Soc. Géol. de France, 2me sér., V. p. 207, February, 1848.
?*Aphanitoma* Bellardi, Moll. Terz. Piemonte, pt. ii. p. 241, 1877.
? *Scobinella* Conrad, Journ. Acad. Nat. Sci. Phila., 2d ser., I. p. 120, August, 1848.
Type, *S. cœlata* Conr., *l. c.*, pl. xii. figs. 8, 9.

The type of *Scobinella* has the anal sinus of a *Pleurotoma* and the plaits of a *Mitra* (4 or 5) diminishing in size forward. *Cordieria* has two plaits, which are high up, not anterior, like those of *Mitra*. In some specimens the second plait is not deposited until a little later than the first, and lags behind it, so that it is not always visible. From this fact has been derived the erroneous assumption that the same species may have, indifferently, one or two plaits. I have not seen *Aphanitoma*, which Tryon unites with *Scobinella;* but, whether this be just or not, it appears to me that *Scobinella* is different from *Cordieria* and sufficiently distinct from *Borsonia*. As far as I can judge, Tryon was right in suspecting that none of the Borsonias in his Manual belong to the genus. They probably belong to *Eucheilodon*, *Glyphostoma*, or *Clathurella*. The present species, however, is genuine, and typical to a very high degree. The genus remounts to the Cretaceous.

Cordieria Rouaultii n. s.

Plate XXXVI. Fig. 11.

Shell yellowish white with a pink vertex and the interspaces between the ribs of a pink brown, generally rather pale; whorls seven or eight, two of which belong to the nucleus; nucleus glassy polished, smooth, swollen, rounded, its second whorl with an obsolete peripheral keel; remainder of the shell with rather strong sculpture; spiral sculpture of three or four strong and a few much finer ridges between the sutures and in front of the anal fasciole; on the last whorl these continue over the base and canal; the anal fasciole shows only traces of the finer spiral threads; transverse sculpture (1) of nine stout short waves, or rounded ribs, with narrower interspaces, beginning in front of the fasciole and obsolete in front of the whorl toward the canal; (2) of rather coarse, strong, and somewhat irregular incremental lines; (3) where the fasciole borders on the suture, the arched incremental lines are crowded into a series of not very regular plications, which form a band or series in front of the suture; the fasciole is slightly excavated; the surface of the shell carries a yellowish opaque thin epidermis; whorls moderately rounded; base subconical; canal short, rather large, slightly recurved and flaring at the tip; anal sinus rounded, rather shallow; outer lip convexly arched, sharp-edged, with or without a rib behind it, according to the stage of growth, with no varix; aperture narrow, long lirate in the throat; columell a straight, near its junction with the body having two strong plaits, which continue internally to the apex of the shell; inner lip with a coat of callus, somewhat reflected anteriorly in the adult. Max. lon. of shell, 13.6; of last whorl, 8.0; max. lat. of shell, 5.0 mm.

Habitat. Stations 272 and 273, at Barbados, in 76–103 fms., over a bottom of coral and broken shells, bottom temperature 59° to 65° F.

This shell, owing to the coarseness of its sculpture, has a somewhat rude appearance, and is very characteristic. Except for the plaits on the pillar, it recalls *Pleurotoma* (*Drillia*) *pagoda*, Reeve.

Genus MANGILIA (Leach) Risso.

This genus is used in a manner which includes all the *Pleurotomidæ* without opercula, as adopted by Dr. Paul Fischer; though this, of course, is a much wider sense than that in which it was originally employed. *Cythara* Schumacher is an older name, but it was applied to a particularly modified species and will better be retained with its original limits. For the purposes of this paper the following groups have been admitted: —

- Subgenus Aforia Dall.
  - Shell large, strong, fusiform; anal notch large, away from the suture. Type, *Pleurotoma circinata* Dall (*insignis* Jeffreys), Bering Strait and Aleutian Islands.
- Subgenus Cythara Schumacher (*C. striata* Schum.).
- Subgenus Daphnella Hinds.
  - Section *Daphnella* s. s. (*D. lymnæiformis* Kiener).
  - Section *Eubela* Dall (*D. limacina* Dall).
- Subgenus Glyphostoma Gabb (*G. dentifera* Gabb).
- Subgenus Mangilia Risso s. s. (*M. costulata* Risso).
- Subgenus Pleurotomella Verrill (*P. Packardi* Verrill).
  - ? Section *Gymnobela* Verrill (*G. curta* Verrill).
- Subgenus Taranis Jeffreys (*T. Mörchii* Malm).

Subgenus AFORIA Dall.

This group has the shell of a typical *Pleurotoma*, but has no operculum; the typical species reaches three or four inches in length, is strongly carinated above the periphery, and the wide rather deep anal sulcus is nearer to the carina than to the suture. The following species is only provisionally referred to this group, as the soft parts are unknown.

? Aforia hypomela Dall.

Shell thin, white, fusiform, with a very thin straw-colored epidermis; nucleus white, vitreous, of one and a half turns, polished, nearly smooth with faint spiral lines and lines of growth; subsequent whorls seven, spirally sculptured with (1) a moderate angulation just behind the periphery of the last whorl, which becomes sharper and peripheral on the earlier whorls; in front of this the whorls are ornamented with numerous rounded threads, separated by much wider somewhat channelled interspaces; on the upper whorls there are 3–6 of these threads, on the last whorl they extend to the anterior end of the canal, becoming more crowded anteriorly; behind the carina the shell is smoother, there are faint spirals, hardly raised, and sparser over the centre of the fasciole than on each side of it; there is no distinct secondary striation; transverse sculpture of faint incremental lines, which rise more or less into little wrinkles at the suture, and sometimes undulate the peripheral angulation on the apical whorls ; suture distinct; whorls moderately full ; aperture ovate ; canal nearly straight, not wide; pillar so twisted as to form a pervious coil extending the whole length of the axis, thin, simple; outer lip thin, modified by the sculpture; notch wide, shallow, half-way between the suture and the carina; outer lip strongly arched forward. Max. lon. of shell, 47.0; of last whorl, 34.0; max. lat. of shell, 15.6 mm.

Habitat. South of Cuba at U. S. Fish Commission Station 2127, in 1639 fms., mud.

This fine and fragile shell recalls *Pleurotoma Catherinæ* Verrill, which has the fasciole at the suture, and probably belongs to a different section. There is nothing like it in the Challenger collection.

Subgenus CYTHARA Schumacher.

Cythara Schumacher, Essai, p. 245, 1817. Type, *Cancellaria citharella* Lamarck (not *Cithara* Klein).

Mangelia Reeve, Conch. Icon., III., 1846. (Same type.) Not *Mangelia* Leach and Risso, 1826.

Eucithara Fischer, Manual, p. 593, 1883.

Cithara Klein, 1753, is not binomial, and is a synonym of *Harpa* Rumphius, 1705, if pre-Linnean names are to be considered. Whether we consider them or not, *Cithara* Klein, being itself a synonym, cannot stand in the way of a proper use of the name such as that made by Schumacher. *Mangelia* Reeve is founded on the same identical type as *Cythara* Schumacher, and is not the same as the *Mangelia* of Risso and Leach, properly spelled *Mangilia*. There are several species known from our southern waters. Of these there is some doubt as to their absolute pertinence to the group of *C. striata* Schum. (= *C. citharella* Lam.), which cannot be cleared up until the soft parts of both are known; but, so far as the shell is concerned, they appear to be closely related. The shells which are known from our coasts and seem to be appropriately referred here are *C. astricta* Reeve, which has been found by Hemphill in Florida among the Keys. *C. balteata* Reeve (non Auct.), which extends from North Carolina southward and is far from rare in Florida, is a very variable shell, especially in regard to slenderness and number of ribs. It can usually be determined by the microscopic character of its surface, covered with fine, close, even frosted spirals, and by its general aspect. The brown band present in so many of this group is not invariably present in any species. *C. biconica* C. B. Adams has the same distribution, but is more abundant. It is a good and well-marked species. Of the group having a polygonal cross-section and translucent glassy shells on which the sharp transverse ribs run from canal to nucleus without a break across all the whorls, there are several forms. These perhaps should be referred to a particular section of typical *Mangilia* rather than to any part of *Cythara*, but I will mention them here. *Mangilia psila* Bush, when fresh, is pink-tipped and transparent. It is the northern representative of *M. lanceolata* Adams, which in the Antilles grows much larger and has spiral color lines. *M. muricoides* Adams, a species of the same general characters, is larger and stouter. I have seen in only from Barbados.

Cythara Bartlettii n. s.

Plate XII. Fig. 6. Plate XIV. Figs. 5, 8.

Shell oval, spire rather acute ; nucleus glassy, dark brown, inflated, of a whorl and a half, followed by five normal whorls ; color pale yellowish, with irregular touches of pale brown especially on the varix ; spiral sculpture of numerous fine subequal rounded little-raised threads, with wider interspaces, covering the whole shell and stronger on the canal; transverse sculpture of (1) extremely fine close parallel hardly raised incremental lines, visible only with the glass, and traversing the spiral interspaces with great regularity and perfect uniformity ; (2) on the antepenultimate whorl about twenty narrow, little raised, long rounded riblets, starting from the suture and fading away on the base ; the spirals run smoothly over the ribs ; fasciole only visible in the curve of the incremental lines; notch narrow, rounded, not deep ; outer lip reinforced in the adult by a rather thick rounded varix from which the thin sharp edge of the lip stands out prominently, arched forward in the middle, and is not contracted for the canal; inner lip simple, pillar obliquely trimmed off in front, otherwise straight ; canal short, wide, not differentiated from the aperture. Max. lon. of shell, 10.0; of last whorl, 7.5 ; lat. of shell, 4.75 mm.

Habitat. Off Havana, in 127 to 450 fms.; Barbados, 100 fms. ; Station 132, near Santa Cruz, in 115 fms., rocky bottom, temperature 65° F. ; also at Key West, between tides, on algæ, H. Hemphill.

The sculpture of this form, when fresh, is very inconspicuous, and the shell looks almost smooth. It is perhaps the smoothest of the group, and may be distinguished in this way from the others.

The young shell has very much the aspect of some of the northern species of *Bela*.

Cythara cymella n. s.

Plate XII. Fig. 4.

Shell long, slender, subhyaline, polished, having a small subglobular, vitreous, tilted nucleus of one and a half whorls, and five and a half subsequent whorls ; color translucent, with a faint yellowish band in front of the suture, visible between the ribs, and two or three spiral series of faint spots on the ribs in front of the yellow on the last whorl, or all whitish; spiral sculpture of numerous fine impressed lines, strongest on the ribs of which they faintly crenulate the crests, and well marked on the canal where the interspaces are slightly raised and rounded; transverse sculpture of (on the last whorl ten) elevated ribs, not continuous from whorl to whorl, extending from suture to canal, thin and slightly curved behind the periphery, a little swollen on the periphery and in front of it again diminishing; suture somewhat appressed, undulated by the ribs; aperture long, narrow; notch rounded, not deep; varix behind the outer lip resembling a stronger rib; outer lip strongly arched forward, thin; canal long, rather narrow; inner lip simple; columella straight, obliquely trimmed off in front; whorls moderately rounded under the ribs. Max. lon. of shell, 12.5; of last whorl, 9.0; max. lat. of shell, 4.5 mm.

Habitat. Gulf of Mexico, at Station 20, in 220 fms.; Barbados, 100 fms.; Station 259, near Grenada, in 159 fms., bottom temperature 53°.5 F.

This elegant species recalls the smooth *C. funiculata* of Reeve, from the Philippines. Like the other species spoken of, when absolutely adult the lips of the aperture are probably finely crenulated, but none of the specimens received show this stage of growth.

Subgenus DAPHNELLA HINDS.

Section *Daphnella* s. s. Shell generally brightly colored, cancellated, or reticulated; the outer lip slightly thickened internally in the adult. Type, *Pleurotoma lymnæiformis* Kiener. West Indies.

These forms are, in the main, shallow-water species. I have been unable to find a specimen of the type with the larval shell intact. Most of the other species have the *Sinusigera* nucleus, but some have a glassy one. The sinus may be shallow or deep.

Section *Eubela* Dall. Shell smooth, glossy, with a sutural band, the outer lip sharp, a shallow anal sinus, and a short angular canal recalling that of *Trichotropis*. Type, *Daphnella limacina* Dall.

These forms are few, and the type is a deep-water mollusk widely distributed.

Section DAPHNELLA s. s.

Daphnella leucophlegma DALL.

Plate IX. Fig. 9.

Pleurotoma (*Daphnella*?) *leucophlegma* Dall, Bull. M. C. Z., IX. p. 70, 1881.

Habitat. Station 2, 805 fms.

This species is the only one of the typical Daphnellas which is white. Its nucleus is small and glassy. The shell has a resemblance to some varieties of *Dolophanes Gabbii*, but has a different nucleus and canal, while there is no trace of a siphonal fasciole.

Daphnella corbicula n. s.

Plate XIV. Fig. 7.

Shell yellowish with pale brown flammules, with a brown *Sinusigera* nucleus of three whorls, high and slender, and five or more subsequent whorls; sculpture on the early whorls of two very strong elevated threads, at a later time there are two intercalary, not quite so strong; on the last whorl there are about ten strong primaries in all, partly on the back of the canal, about five intercalaries on the body of the whorl, and on all the unoccupied area very fine numerous granulous or frosty spiral threads; on the fasciole there are no other spirals; transverse sculpture (1) of fine sharp incremental lines, which produce the shagreening of the tertiary spirals; (2) of numerous elevated rounded threads, which reticulate the stronger spirals, induce little nodes at the intersections, and extend from the front margin of the fasciole forward over the whole whorl, disappearing only on the back of the canal; the interstices are deep, and nearly square; whorls rounded, shouldered by the strong posterior primary spiral thread; canal nearly straight, very wide, hardly differentiable from the aperture; pillar nearly straight with little callus; outer lip thin, crenulated by the sculpture; notch at the suture narrow, and about 1.0 mm. deep; suture appressed, not very distinct. Max. lon. of shell, 11.2; of last whorl, 8.0; max. lat. of shell, 4.7 mm.

Habitat. Barbados, 100 fms. U. S. Fish Commission Stations 2595 and 2596, in 49–63 fms., sand, 20 miles off Cape Hatteras, N. C., bottom temperature 75°.0 F.

The specimen figured is from Hatteras. The bold sculpture of this species is very recognizable, — even a small fragment can be easily identified, — and it is not very much like any of the other described species.

Daphnella reticulosa n. s.

Plate X. Fig. 10.

Shell small, translucent white or yellowish, of porcellanous texture, with a *Sinusigera* nucleus, followed by five and a half normal whorls; general shape elegantly fusiform, but with a rather blunt-ended canal; spiral sculpture of fine even rounded elevated threads, nearly uniform all over the shell, about half as wide as the interspaces in most of which run an extremely fine intercalary thread; the primary threads average about eight in the breadth of a millimeter; transverse sculpture, first, of very fine distinct uniform lines of growth about twice as numerous in the same space as the primary spiral threads, which last are beautifully reticulated and to some extent rendered nodulous, or rather minutely wavy, by the intersections; secondly, on the earlier whorls, of rather stout distant rounded riblets or waves seven or eight to a whorl, most distinct on the first whorl and entirely evanescent on the last two whorls;

these are slightly oblique, and extend from the anterior margin of the anal fasciole to the suture in front; whorls a little irregular in form; suture strongly appressed; sculpture, as usual, less strong, but still perfectly distinct, on the fasciole; the notch rather deep, semicircular behind. Aperture longer than half the shell, moderately narrow, with the canal well defined and somewhat curved to the right; outer lip thickened within, slightly dentate at the margin from the spiral sculpture; a slight callus on the body and pillar, well inside the aperture; pillar nearly straight. Lon. of shell, 11.5; of last whorl, 9.0; of aperture, 7.0; lat. of shell, 5.2; of aperture, 2.0 mm.

Habitat. Station 272, in 76 fms., off Barbados, hard bottom, coarse sand and shell; temperature of bottom water, 65°.0 F.

This is an extremely pretty little shell, not properly of the deep-sea fauna, perhaps, but apparently undescribed and (except for its stronger sculpture) bearing a curious resemblance in miniature to *Pleurotomella Emertonii.*

Daphnella pompholyx n. s.

Plate XXXVI. Fig. 4.

Shell thin, inflated, polished, with a brown *Sinusigera* nucleus of three whorls, and five subsequent whorls; color yellowish white, with faint axially directed streaks and blotches of olive brown, and articulating dots of the same in the region of the canal; spiral sculpture of faint close-set scratches or half-obsolete minute threads more or less visible over the whole surface, and on the last whorl in front of the fasciole about twenty-five channelled sharply cut grooves separated by considerably wider flat interspaces; the grooves are nearer together on the canal, and the interspaces there become rounded, almost thread-like; transverse sculpture of, on the fasciole, numerous little-elevated arched regularly-spaced ripples, with slightly wider interspaces; these fade away in front of the fasciole, or appear only as irregularities of growth which punctuate the channels but are obsolete on the interspaces; whorls rounded, fasciole only slightly excavated, the posterior edge appressed at the suture; aperture large, outer lip rather straight in the middle, contracted suddenly to form the canal, the edge sharp, the sculpture transvisible, the notch shallow and its corners rounded off; columella straight, simple, rather long, canal distinct, not recurved; the periphery of the last whorl a little flattened. Max. lon. of shell, 12.5; of last whorl, 9.2; max. lat. of shell, 6.0 mm.

Habitat. Station 273, near Barbados, in 103 fms., coral and shells, bottom temperature 59°.5 F. Station 299, near Barbados, in 140 fms., coral, temperature 56°.5 F.

This shell has somewhat the same outline as *D. reticulosa*, but its sculpture is entirely different; it is larger, thinner, and has a different nucleus. The dry animal in one specimen is destitute of an operculum.

Daphnella retifera n. s.

Shell small, thin, oval, short-spired, yellowish with pale cloudy markings of brownish; nucleus of the *Sinusigera* type to begin with, but not strongly sculptured, and the larval shell after 2½ turns of the usual sort becomes smooth and continues for 2½ whorls more, quite smooth and rounded, before the normal sculpture begins; the latter continues in the largest specimen for 2½ turns more. The fasciole is hardly discernible except by following the incremental lines; it is sculptured like the rest, and not excavated; the suture is distinct; the sculpture is composed of numerous fine sharp spiral threads with slightly wider interspaces, crossed by somewhat less prominent transverse threads, making a very regular reticulation over the whole surface; at most of the intersections a small point elevates itself, giving a peculiarly rasp-like appearance to the dull unpolished surface of the shell; notch shallow, situated at the suture; aperture pointed behind, outer lip arched well forward, hardly contracted for the broad short canal; edge thin, interior not lirate; columella not callous, nearly straight, simple, very slightly recurved at the end of the canal; whorls moderately rounded. Lon. of shell, 6.5; of last whorl, 5.0; lat. of shell, 3.0 mm.

Obtained by the U. S. Fish Commission at Stations 2595 and 2596, twenty miles E. S. E. from Cape Hatteras, in 49–63 fms., sand, bottom temperature 75°.0.

This is a very delicate and elegant little shell, remarkable for the number and size of its larval whorls and the prickly reticulation. In color, though less decided, it recalls *D. lymnæiformis* Kiener.

Daphnella morra Dall.

Plate XII. Fig. 1.

Pleurotoma (*Drillia*) *morra* Dall, Bull. M. C. Z., IX. p. 69, 1881.

Habitat. Sigsbee, off Havana, 450 fms. U. S. Fish Commission Stations 2595, 2596, 2608, and 2614, in 22 to 168 fms., sand, off the coast of North Carolina, temperature 75°.0 F.

The examination of more material has shown that this should be placed in *Daphnella*. When fresh it is of a glistening translucent rich brown; the spire is often quite lax, in other cases more compactly coiled, so that at first the specimens would seem unrelated, especially if one was fresh and the other dead and opaque. This little shell has some general resemblance to *Lachesis minima*, but in details of nucleus and aperture the difference is conclusive.

? Daphnella elata Dall.

Shell small, *Mangilia*-like, elongated, narrow, translucent white with streaks and lines of dark brown or yellow; nucleus with the first whorl minute, tilted, glassy, the subsequent turns translucent, smooth, or with oblique transverse sculpture which almost imperceptibly passes into the ribbing of the adult ; in all there are seven whorls including the nucleus ; the early ones are rounded, and soon take on an angulation just in front of the fasciole ; spiral sculpture of three or four fine threads on the fasciole, and three or four stronger threads between the fasciole and the suture in front ; on the last whorl there are fifteen or twenty of these between the shoulder of the whorl and the front end of the canal ; they are not perfectly uniform in size, and between them are frequently much finer lines ; these cross about (on the last whorl) fifteen transverse rounded riblets, which extend from near the suture forward to the canal ; the last whorl is rather compressed ; the aperture elongated and narrow ; the outer lip angulated at the shoulder, with a broad shallow rounded anal notch, thin edge, and smooth interior ; inner lip nearly straight, anteriorly a little oblique, canal short, hardly differentiated, not recurved. Lon. of shell, 4.75 ; of last whorl, 3.25 ; lat. of shell, 2.0 mm.

Habitat. Twelve miles east of Frying Pan Shoals, in 12 fms., Dr. Rush. U. S. Fish Commission, at Stations 2608, 2610, 2616, and 2619, in 15–22 fms., sand, off the coast of North Carolina, bottom temperature 78°.5 F.

This pretty little shell may be a *Mangilia*, but its form seems more like that of a *Daphnella;* conchologically it is intermediate between the two. It is related to the group containing such forms as *M. cerina* and *M. citronella,* and to many of the forms from the tropics included by Tryon in *Daphnella.*

Section EUBELA Dall.

Daphnella limacina Dall.

Plate IX. Fig. 10.

Pleurotoma (Bela) limacina Dall, Bull. M. C. Z., IX. p. 55, August 12, 1881.
Daphnella limacina Dall, *op. cit.*, p. 102, Oct. 31, 1881.
Pleurotoma (Defrancia) hormophora Watson, Linn. Soc. Journ., XV. p. 457, Nov. 3, 1881.
Clathurella hormophora Watson, Chall. Gastr., p. 351, pl. xxi. fig. 9, 1885.
Daphnella limacina Verrill, Trans. Conn. Acad., V. p. 452, 1882 ; VI. p. 265, 1884.

Habitat. Station 2, 805 fms., Gulf of Mexico ; Yucatan Strait, 640 fms. ; bed of the Gulf Stream, in 447 fms. ; Station 136, near Santa Cruz, in 508 fms., ooze, bottom temperature 42°.5 F. U. S. Fish Commission Station 994, in 368 fms., off Martha's Vineyard ; and Station 2646, in 85 fms., sand, off Cape Florida. Challenger Expedition Stations 23 and 24, off Sombrero and Culebra Islands, West Indies, in 390–450 fms., pteropod ooze ; and Station 122, off Pernambuco, Brazil, in 350 fms., red mud.

This lovely little shell has a well-marked *Sinusigera* nucleus, which is figured by Watson, but it is often more depressed than in the specimen he figures, especially at the vertex.

Daphnella calyx n. s.

Shell decollate and with the aperture imperfect, having evidently the general form of the preceding, but with a slightly more differentiated canal; surface smooth, polished, with a distinct suture in front of which the fasciole appears as a narrow raised band, with an incised line in front of it and marking its edge; the only other sculpture consists of six or seven sharply incised lines on the canal near its anterior end; whorls and base full and rounded; incremental lines visible but faint; color yellowish white with about ten spiral bands of alternate whitish and reddish brown rectangles on the last whorl arranged like the squares on a checkerboard, except that, the white rectangles being longer than the brown ones and the latter being symmetrically arranged, the angles of the brown rectangles in one line do not generally connect with those of the lines in front and behind it; on the curve of the base the rectangles are drawn somewhat lozenge-shaped. Lon. of the last whorl, 3.75; lat. of same, 2.75 mm.

Habitat. Station 2602 of the U. S. Fish Commission, 36 miles S. ½ W. from Cape Hatteras, N. C., in 124 fms., sand, bottom temperature 61°.0 F.

This specimen is but a fragment, yet its characters are so remarkable that a much smaller fragment would be recognizable at once, so I have decided to name it.

A fragment of a perfectly white shell closely related to *D. calyx*, but finely spirally striate and with a somewhat depressed fasciole, smooth and not bounded by a groove, the columella much arched and the form slender, was dredged at Station 2, in 805 fms. It is too imperfect to describe, but belongs to no species known from the region.

? Daphnella sofia n. s.

Plate X. Fig. 11.

Shell small, delicate, whitish, with a four-whorled brown, trochiform, *Sinusigera* nucleus and four subsequent rather slender whorls; transverse sculpture consists of faint delicate lines of growth, which are puckered or gathered into a sort of narrow frill or band, appressed against the suture and bounded in front by the smooth anal fasciole, on which the anterior ends of the wavelets become obsolete; spiral sculpture rather strong on the periphery of some of the earlier whorls, but elsewhere consisting of faint threads and grooves which are extended forward more or less distinctly to the end of the canal; notch small, not deep, close to the suture; fasciole smooth, slightly impressed; aperture elongated, simple (the specimen being adolescent); pillar without callus, thin, its edge slightly reflected and so twisted as to make the axis of the shell, viewed from the anterior end, minutely pervious; canal narrow, rather long, outer lip thin, arched forward. Lon. of shell, 8.0; of last whorl, 5.5; lat. of shell, 3.0 mm.

Habitat. Station 163, off Guadelupe, in 769 fms., sand, temperature 39°.75 F.

Daphnella sofia var. hyperlissa Dall.

Shell shorter, stouter, with a shorter and wider canal; the axis more widely pervious; suture appressed without the puckered band, but with a few faint arched wavelets which nearly cross the fasciole, not forming a band; there are three normal and three or four *Sinusigera* whorls, all of which are more inflated, while the fasciole is less sloping. There are no strong threads on the periphery of the early whorls. Lon. 8.5; lat. 4.2 mm.

Habitat. U. S. Fish Commission Station 2678, off Cape Fear, N. C., in 731 fms., ooze, bottom temperature 39°.8 F.

The shell (adolescent) much resembles *D. sofia*, except in the particulars mentioned.

Subgenus GLYPHOSTOMA Gabb.

? *Eucheilodon* Gabb, Journ. Acad. Nat. Sci. Phila., 2d ser., IV. p. 379, 1860.

Glyphostoma Gabb, Proc. Acad. Nat. Sci. Phila. for 1872, p. 270. Type, *G. dentifera* Gabb, *l. c.*, p. 271, pl. xi. fig. 4, Feb., 1873.

Glyphostoma Fischer, Manual, p. 573, 1883; as a section of *Mangilia.*

Lienardia Jousseaume, Bull. Soc. Zoöl. de France, VIII. xl. 1884 (*fide* Tryon, Man. *Pleurotomidæ,* pp. 271, 353, 1884).

This group, described from the Miocene of Santo Domingo, appears in the recent state in the Antillean seas. A peculiarity not mentioned by Gabb is that the surface of the whole shell is covered with a very delicate microscopic granulation or shagreening.

Glyphostoma dentifera Gabb ?

Glyphostoma dentifera Gabb, Proc. Acad. Nat. Sci. Phila. for 1872, p. 271, pl. xi. fig. 4, Feb., 1873. Trans. Am. Phil. Soc., XV. p. 210, 1873.

Habitat. Sand Key, in 15 fms.

A single imperfect specimen of *Glyphostoma* was obtained as above. It does not agree with any of the others, but is so like Gabb's figure of his type, that I refer it provisionally to *G. dentifera.* The shagreening is extremely fine, and gives a faint dusty appearance to the surface under an ordinary hand magnifier of 8–10 diameters.

Glyphostoma Gabbii n. s.

Plate XIII. Figs. 4, 5, 7, 8.

Shell white, with a peripheral and a basal brown band with ill-defined boundaries, and a blotch of brown on the canal; the transverse ribs show lighter through the peripheral band and the glassy nucleus is brownish; nucleus acute, three-whorled, the first whorl smooth, rounded, tilted, minute; the others smooth, polished, keeled on the periphery, after which the remaining seven whorls become sculptured ; spiral sculpture of numerous regular rather coarse rounded threads with equal or wider interspaces, the three most prominent on the peripheral brown band more widely separated than the others; on the anal fasciole the threads are finer and closer ; when passing over the transverse ribs the threads are rarely swollen or nodulous, nor do they weaken between the ribs ; transverse sculpture of (1) numerous small, gathered up nodulosities, forming a row coronating the whorl at the anterior edge of the suture ; (2) thirteen or fourteen stoutish ribs, beginning in front of the anal fasciole, extending over the periphery, under the spirals, bifurcating or even trifurcating on the base, and becoming obsolete toward the canal; whorls rounded, turrited by the fasciole ; base rounded-conic; canal rather long, sharply curved to the right, slightly funnel-shaped at its extremity; sinus, in the young, shallow; in the adult, strongly marked, not deep, but roundly excavated in the thick varix, nearly closed by a parietal lump of callus and a projection from the outer lip, which are rounded and smooth at first, but later are transversely ridged or lirate ; aperture narrow, backed by a stout varix, arched forward in the middle, behind which the shell is deeply indented ; outer lip thin, standing out from the inner edge of the varix, transversely lirate ; inner lip generally smooth, except for the parietal lump above mentioned, but, when completely adult, furnished in the middle with two small oblique transverse ridges, rather distant from each other, and from a series of eight or nine close-set similar ridges on the columella extending nearly to the end of the canal, recalling the ridges in the aperture of a *Trivia ;* these are very short and do not coincide with the spiral sculpture. Max. lon. of shell, 17.5 ; max. lon. of last whorl, 11.0 ; max. lat. of shell, 7.8 mm.

Habitat. Station 36, Gulf of Mexico, in 84 fms. ; Station 65, off Havana, in 127 fms.; Station 132, in 115 fms., off Santa Cruz, on rocky bottom ; Station 147, off St. Kitts, in 250 fms., sand; Station 155, off Montserrat, in 88 fms. ; Station 220, near Santa Lucia, in 116 fms., rocky bottom ; off Barbados, in 100 fms. ; at Stations 272 and 282, in 76–154 fms., coral ; and Station 296, in 84 fms., hard bottom. Also by the U. S. Fish Commission at Station 2405, in the Gulf of Mexico, west of Florida, in 30–50 fms., sand and coral.

This elegant species was submitted to Mr. Tryon when engaged upon his monograph of the *Pleurotomidæ*, and regarded by him as new. Though beautifully fresh, not a single specimen came to hand with the soft parts included. The surface is covered with a beautiful minute shagreening, which to be seen requires a magnification of six or eight diameters. The figures do not show the peculiar denticulation of the inside of the aperture. Most of the specimens were without it, and the only adult specimen figured is turned so that the outer lip would hide this peculiar feature. As the specimens for figuring were selected long before they could be critically studied in some cases, it was impossible always to avoid such omissions.

Glyphostoma gratula Dall.*

Plate XII. Fig. 10.

Pleurotoma (Drillia) gratula Dall, Bull. M. C. Z., IX. p. 64, August, 1881.
Pleurotoma (Drillia) incilis Watson, Linn. Soc. Journ., XV. p. 425, October, 1881.
Report Chall. Gastr., p. 304, pl. xxiv. fig. 5, 1885.

Shell similar to the last, but white, with the spiral sculpture sharp instead of rounded and the intervals wider and more irregular; the shell is more slender in proportion to its length, and the last whorl smaller in proportion to the spire ; the ribs (about 16) are sharp and the spirals minutely nodulous where they cross the crests of the ribs ; the latter cross over the periphery and grow gradually smaller to the canal, never bifurcating; the varix is much thinner, and the indentation behind it much less marked ; there is no gathering up of nodulations at the suture, and the anal fasciole is smoother or even quite free from spiral threads. The largest specimen had not completed its lirations in the aperture and on the inner lip, but they seemed fewer, coarser, and more irregular than in *G. Gabbii.* Max. lon. of shell, 17.5 ; of last whorl, 10.5 ; max. lat. of shell, 6.0 mm. There are seven normal and three nuclear whorls.

Habitat. Gulf of Mexico, at Station 2398, in 227 fms., mud, between the Mississippi delta and Cedar Keys, Florida; and Station 2150 in 382 fms., ooze, near Old Providence, U. S. Fish Commission. Off Culebra Island, in 390 fms., Challenger Expedition. Station 43, Gulf of Mexico, in 339 fms. ; Station 19, in 310 fms. Off Havana, in 292–805 fms., Blake Expedition. Bed of the Gulf Stream, Pourtalès, in 447 fms.

Both the specimen figured by Mr. Watson and that here figured are not quite mature, and do not show the adult mouth characters. Indeed, it was not until I had examined the Fish Commission specimens that I realized the true position of the species. The species varies considerably as regards the height of the spire in proportion to the last whorl. Perhaps Mr. Watson's name may be retained for the shorter ones as variety *incile.*

Glyphostoma phalera n. s.

Shell white, acute, seven-whorled; nucleus glassy, rounded, not keeled, having about $1\frac{1}{2}$ whorls ; remainder of the shell solid, finely granulated with microscopic granules, which are arranged in close, even transverse lines between the spirals; spiral sculpture of numerous rather coarse flattish threads with about equal or narrower interspaces, the fasciole with much finer threads or nearly smooth ; transverse sculpture of faint waves or obsolete ribs (about nine on the last whorl) with a tendency to bifurcate toward the canal ; suture strongly appressed with obscure undulations on the margin of the fasciole bordering the suture ; base rounded conic ; spire acute ; whorls below the fasciole moderately rounded ; varix thick, broad, and strong, with a slight depression behind it ; canal short, slightly recurved ; anal sulcus shallow, rounded ; aperture very narrow, about nine liræ inside the outer lip, stronger posteriorly ; liræ on the inner lip and pillar (mature ?) less strong and not so numerous. Max. lon. of shell, 12.3; of last whorl, 8.0; max. lat. of shell, 5.3 mm.

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* This is one of a few species of *Pleurotoma* in which, publishing almost simultaneously, my friend Mr. Watson and myself have unintentionally both named the same species. Our manuscripts went to the printer about the same time ; but mine were published immediately, while his were several months delayed. I had thought of resigning my names in favor of his, as first figured, but have been advised by several naturalists that this was not admissible, and would cause confusion in the nomenclature.

Habitat. U. S. Fish Commission Station 2123, near the island of Trinidad, in 117 fms., mud, bottom temperature 59°.5 F.

This species is smoother than any yet described, but it is possible the strength of the transverse sculpture may be greater in some individuals. The most prominent characters beside the weak transverse sculpture are the appressed fasciole at the suture, and short sharp spire. It has a much shorter canal, narrower mouth, and less channelled fasciole than *G. Gabbii.*

Subgenus MANGILIA (Leach) Risso.

Many of the species referred to this group are only known from the shells. Except in cases where it is otherwise stated, the reference must be understood as provisional.

Mangilia caribæa Orbigny.

Pleurotoma caribæa Orb., Moll. Cuba, II. p. 172, pl. xxiii. figs. 32, 34, 1846.

Habitat. Barbados, 100 fms. Martinique, Guadelupe, and Cuba, Orbigny.

Mangilia Lavalleana Orbigny.

Pleurotoma Lavalleana Orbigny, Moll. Cuba, II. p. 174, pl. xxiv. figs. 7, 9, 1846.
Pleurotoma Vespuciana Orbigny, *op. cit.*, p. 175, pl. xxiv. figs. 13, 15.

Habitat. Barbados, 100 fms. Antilles, Orbigny.

The two forms named by Orbigny would appear to differ only in age. *P. antillarum* Orbigny, which grows half an inch long, is probably another species.

Mangilia atrostyla Dall.

? *Drillia limonitella* Dall, Proc. U. S. Nat. Mus., 1883, p. 329, pl. x. fig. 10, Dec., 1883.
Daphnella atrostyla (Dall, MS.) Tryon, Man., VI. part 3, p. 310, pl. xxxiv. fig. 100, October, 1884 (as var. of *cerina*).
Mangilia ephamilla Bush, Trans. Conn. Acad., VI. p. 457, pl. xlv. figs. 4, 4 a, June, 1885.

Habitat. Barbados, 100 fms. Station 185, near Dominica, in 333 fms., sand, bottom temperature 44°.0 F. Northward to the coast of North Carolina, U. S. Fish Commission.

There are several closely allied small forms found on our southern coast which it may be well to differentiate, as without careful discrimination and study they are liable to be confounded, as by Mr. Tryon, though they are separated by what appear to be very constant characters. The species are *M. cerina* Kurtz & Stimpson, *M. cerinella* Dall, *M. citronella* Dall, *M. serga* Dall, *M. atrostyla* Dall, *M. limonitella* Dall, and *M. ephamilla* Bush. I have been able to study typical specimens of all of them. They all have transverse ribs, fine granulous or frosty spiral sculpture, and are distributed over very much the same region. In order of size they run from *citronella*, which is the smallest, through *cerina, limonitella, serga*, and *atrostyla*, to *cerinella*, which is the largest. They have, in the same order, omitting the nucleus, five whorls, up to *atrostyla* which has six, and *cerinella* which has seven. *M. citronella* is of a brilliant yellow, *cerina* of a waxen white tending to ash color on the upper whorls, but no lines of color or any tint on the columella or lip ; *limonitella* is whitish, lineated spirally with yellow brown and often with some brown on the outside of the canal or on the pillar; *serga* as far as known is pure white ; *atrostyla* is variable as to its colors, ranging from yellowish white to dark brown, wholly or in stripes and bands; but the most typical form has a dark purple brown shade just in front of the suture, the rest of the shell ashy, or waxen white, except the pillar, which is very dark purple or almost black. All the Antillean specimens I have seen are colorless. It may prove to be a larger form of *limonitella*, which is the older name. *M. cerinella* is whitish toward the vertex, ashy on the intermediate whorls, and with a tendency to orange or flesh-color for the body whorl; it is never striped or spotted, and the pillar is always like the rest of the last whorl.

M. citronella has a very minute brown tilted nucleus followed by three trochoid larval whorls; a spire markedly shorter than the last whorl, with inflated whorls ; twelve riblets, no varix, and a very faint sutural notch, while the suture is distinct and not appressed. The four larval whorls are prettily marked with transverse concave ripples. Lon. 6.25 ; last whorl, 4.25 ; lat. 2.5 mm. (See Plate IX. fig. 5.) Off Sombrero, in 70 fms.

M. cerina has a smaller larval shell with a less acute apex, the spire nearly equal to the last whorl, with flattish whorls angulated at the periphery, nine swollen riblets, no varix, the notch well marked and away from the suture which is broadly appressed and undulated ; the canal is very short and the ribs arched when they extend over the fasciole, where they usually fail. The nuclear whorls are smooth except the last, which has three or four nodulous spiral lines on it. Lon. 6.75; last whorl, 3.75 ; lat. 2.1 mm. North Carolina to Florida.

M. limonitella has the spire but a trifle shorter than the last whorl, the whorls rounded, and angulated behind the periphery, twelve narrow riblets, no varix ; the notch shallow, deepest near the angulation ; suture hardly appressed or undulated; canal not differentiable from the aperture ; ribs obsolete on the fasciole, or, if present, arched in harmony with the lines of growth. Lon. 7.1 ; last whorl, 3.7 ; lat. 2.5 mm. Florida. Fresh specimens show this to be a

Mangilia, and I suspect it to be a differently colored dwarf form of what I afterward called *atrostyla*.

M. serga has a larger and differently sculptured larval shell, a much sharper and more rasp-like sculpture with a few spirals larger than the rest; the angulation more peripheral and less marked, the last whorl longer and narrower proportionally, the notch wide but not quite sutural; the suture distinct, not appressed, marginated by a thread; ribs thirteen, no varix; canal longer; ribs narrow, not strong except on the periphery and almost spinose at the intersection of the primary spirals. Lon. of shell, 9.0; last whorl, 5.12; lat. 3.1 mm. Antilles and Straits of Florida.

M. atrostyla differs from *limonitella* by larger size, stronger shoulder, deeper suture, having only eight ribs, the last of which forms a strong varix; and in its usual color markings. Lon. 8.75 ; last whorl, 5.0; lat. 3.1 mm. Hatteras to the Antilles. *M. ephamilla* Bush is an immature color variety of *atrostyla* proper.

M. cerinella recalls *cerina* by its color, is much larger than the genuine *cerina*, more drawn out and slender; it has only six or at most seven ribs, a short aperture, no canal to speak of, and hardly any indentation for a notch; the suture is less appressed and undulate ; while the ribs are almost obsolete in the fasciolar region ; the angulation is nearly at the periphery and the slopes either way from it are nearly equal. Lon. 11.75; last whorl, 5.87; lat. 3.75 mm. North Carolina to Florida and Texas.

Mangilia quadrata Reeve.

Pleurotoma quadrata Reeve, P. Z. S. 1845, p. 114; Conch. Icon. *Pleurotoma*, pl. xxviii. fig. 253 (magnified), 1845.

Clathurella quadrata Tryon, Man., VI. p. 278, pl. xviii. fig. 31, 1884.

Habitat. West Indies, Krebs, Tryon.

I have no doubt that Krebs and Tryon are right in identifying Reeve's species with *P. diminuta* C. B. Adams, a name proposed for the West Indian shell should it prove to be different. This species differs from the group of which *atrostyla* is a type chiefly in its stronger sculpture and consequently prominent outer lip at the resting stages. It has similar nucleus, habits, granular spiral sculpture, and distribution.

There are several forms which may be treated as varieties, being connected, though the extremes seem widely separated by intermediate forms.

Mangilia quadrata var. quadrata.

Shell resembling Reeve's figure, which is three times magnified, though this is not stated in the text. Miss Bush's *M. eritima*, judged by an author's specimen before me, agrees well with this variety. The red color mentioned by her, on the pillar and throat, is very rarely developed; I find it on only one specimen out of many. Range, North Carolina to Yucatan and the West Indies.

Mangilia quadrata var. diminuta Adams.

These differ from the type in the greater strength of the sculpture. The mouth and pillar are white. Same range as the preceding. I have distributed some specimens of this under the manuscript name of *corticaria* before recognizing its relations.

Mangilia quadrata var. rugirima Dall.

This differs from *diminuta* in being smaller and shorter proportionally, and with the strength of the sculpture even more exaggerated. Key West.

Mangilia quadrata var. monocingulata Dall.

Plate XI. Figs. 15, 16.

This variety differs from *diminuta* by having one more rib (nine in all) and in having the basal cingulum obsolete so that the prominence of the posterior nearly peripheral angulation though not enlarged is much more apparent. This is shown in Figure 15. Figure 16 shows a further modification, in which the number of primary spirals is diminished, and those that are left are less prominent, thus making the whorls appear more rounded. Both of the specimens figured are not quite adult, and hence do not show the aperture fully formed.

Habitat. Barbados, 100 fms.

Mangilia serga Dall.

Plate IX. Fig. 4.

Pleurotoma (*Drillia*) *serga* Dall, Bull. M. C. Z., IX. p. 65, August, 1881.
Pleurotoma (*Mangelia*) *acanthodes* Watson, Linn. Soc. Journ., XV. p. 433, Oct., 1881.
Chall. Gastr., p. 342, pl. xxiii. fig. 3, 1885.
Pleurotoma serga Dall, Bull. M. C. Z., XII. pl. ix. fig. 4, expl., 1886.

Habitat. Bed of the Gulf Stream, Pourtalès, 447 fms. Also by the U. S. Fish Commission, at Station 2150, near Old Providence, in 382 fms., ooze bottom temperature 56°. F. Off Bermuda, in 1075 fms., Challenger Expedition.

This species would appear to be identical with *acanthodes*, while *M. corallina* Watson evidently belongs to this group, though I do not find its exact equivalent among my specimens. It is within the bounds of possibility that it may be an extreme variety of *M. serga*, especially as between my two specimens of *M. serga* there is a notable amount of variation.

Mangilia ? halitropis n. s.

Shell with eight whorls and a small *Sinusigera* nucleus, white or ashy, with a pointed spire and broad body whorl ; surface microscopically granose or shagreened ; fasciole wide, smooth except for faint arched incremental lines, excavated, extending from the appressed suture to the angle of the whorls ; spiral sculpture of slender elevated threads, tending to run in pairs, with wide interspaces, and extending from the fasciole to the suture in front; there are five or six on the whorl next to the last and 20–22 on the last whorl including the canal; these, without becoming swollen, run over (on the last whorl 16) numerous oblique riblets, beginning at the angle of the whorls where they are largest, crossing the whorl and becoming obsolete on the base ; mouth rather narrow, outer lip thin, arched ; notch at the suture moderately deep, rounded ; inner lip slightly excavated, pillar straight, attenuated in front ; canal short, slightly twisted. Lon. of shell, 17.0 ; of last whorl, 11.0 ; of aperture, 7.0 ; max. lat. of shell, 6.8 mm.

Habitat. Station 136, near Santa Cruz, in 508 fms., ooze, temperature 42°.5 F.

This looks a little like a *Drillia* not mature, but from the character of its surface is probably allied to the preceding species.

Mangilia ? ipara Dall.

Plate XI. Fig. 14.

Pleurotoma (*Mangilia* ?) *ipara* Dall, Bull. M. C. Z., IX. p. 57, August, 1881.

Habitat. Yucatan Strait, 640 fms. ; Station 195, near Martinique, a fragment, in 502 fms.

Mangilia ? peripla Dall.

Plate XI. Fig. 17.

Pleurotoma (*Drillia*) *peripla* Dall, Bull. M. C. Z., IX. p. 68, August, 1881.
Pleurotoma (*Defrancia*) *chyta* Watson, Journ. Linn. Soc., XV. p. 466, Nov., 1881. Chall. Gastr., p. 358, pl. xviii. fig. 4, 1885.

Habitat. Yucatan Strait, 640 fms.

As observed elsewhere, this species is very closely related to *elusiva.* The spiral sculpture is equally composed of two sets of threads, a coarse and a fine series. *M. ipara* and its connections have only one kind of spirals, but in other respects they approach *peripla*, etc. very nearly.

Mangilia ? elusiva Dall.

Plate XII. Fig. 7.

Pleurotoma (*Drillia*) *elusiva* Dall, Bull. M. C. Z., IX. p. 69, August, 1881.
? *Pleurotoma* (*Defrancia*) *perpauxilla* Watson, Linn. Soc. Journ., XV. p. 468, Nov., 1881. Chall. Gastr., p. 359, pl. xxii. fig. 7, 1885.

Habitat. Yucatan Strait, 640 fms. Off Culebra Island, in 390 fms., Challenger Expedition.

I am inclined to think that Mr. Watson's *Pl. perpauxilla* is a young specimen of this species. At all events it is evidently immature and closely related to *elusiva* and its connections.

Mangilia bandella Dall.

Plate X. Fig. 3.

Pleurotoma (Mangilia) bandella Dall, Bull. M. C. Z., IX. p. 59, August, 1881.
Pleurotomella diomedeæ Verrill & Smith, Trans. Conn. Acad., VI. p. 152, pl. xxxi. figs. 5, 5 a, 1884.
Pleurotomella bandella Verrill, Trans. Conn. Acad., VI. p. 250.

Habitat. Station 47, Gulf of Mexico, in 321 fms., bottom temperature 47°.0; Station 236, off Bequia, in 1591 fms., ooze, temperature 39°.0. U. S. Fish Commission, at numerous Stations off the east coast of the United States, in 1200 to 2100 fms.

The metropolis of this species would appear to be in the northern waters.

Mangilia antonia Dall.

Plate X. Fig. 4. Plate XI. Fig. 11.

Pleurotoma (Mangilia) antonia Dall, Bull. M. C. Z., IX. p. 59, August, 1881.

Habitat. Cape San Antonio, 640 fms.; Station 163, near Guadelupe, in 769 fms., sand, temperature 39°.7 F.

This species or race may be distinguished from the preceding by the absence of the raised pre-sutural band, the more elevated and slender form, and its sparse widely separated and rather strong spirals as compared with the rather faint and close-set flat spirals of *M. bandella.*

Mangilia comatotropis Dall.

Plate XI. Fig. 12.

Pleurotoma (Mangilia) comatotropis Dall, Bull. M. C. Z., IX. p. 58, August, 1881.
Pleurotoma (Mangilia) tiara Watson, Journ. Linn. Soc., X. p. 440, Oct., 1881; Chall. Gastr. p. 347, pl. xxi. fig. 7, 1885.
Pleurotoma comatotropis Verrill, Trans. Conn. Acad., V. p. 452.
Taranis pulchella Verrill, Trans. Conn. Acad., V. p. 487, pl. lvii. fig. 17 (young), June, 1882; *op. cit.,* VI. p. 267, pl. xxix. fig. 8, 1884.

Habitat. Off Cape San Antonio, Yucatan Strait in 640 fms.; Barbados, 100 fms. U. S. Fish Commission, off the east coast of North America from New England to Florida, in 50–500 fms., and south of Cuba, at Station 2135. in 250 fms. Challenger Expedition, off Bermuda and Culebra Island, 390–1075 fms., mud. It has been found in temperatures from 38°.5 to 75°.0 F.

Mangilia scipio n. s.

Plate X. Fig. 13.

Shell extremely slender, thin, white, with nine or ten delicately rounded whorls; transverse sculpture consisting only of the delicate yet evident lines of growth; nucleus very small, not differentiated from the rest of the shell by color or texture; three nuclear whorls marked by a distinct, apparently finely serrate equatorial carina, which soon becomes obsolete; fasciole slightly concave, smooth, except for lines of growth; remainder of whorl covered with fine slightly raised spiral threads separated by nearly equal interspaces and continued to the anterior end of the canal; last whorl more than half the length of the shell; aperture simple, the notch broad, not very deep, and lying upon the preceding whorl; outer lip moderately arched forward, simple; columella hardly washed with callus; canal rather narrow and unusually long. Lon. of shell, 14.0; of last whorl, 8.0; max. lat. of shell, 3.2 mm.

Habitat. Station 288, off St. Vincent, in 124 fms., bottom temperature 57°.3. Station 190, near Dominica, in 542 fms., ooze, temperature 39°.3 F.

This is a remarkably delicate and singular shell; the mouth being broken, the characters of the lip were made out from the lines of growth. It is not like any other species known to me. The nearest relative seems to be *Daphnella* *[illegible]* Watson, which is much larger and less attenuated in proportion to its size. The long narrow canal of the present species forbids its reference to *Daphnella*, and it is not improbably related nearly to the *Pleurotomella* group, and to *M. pelagia* Dall.

Mangilia pelagia Dall.

Plate XI. Fig. 8.

Pleurotoma (*Mangilia*) *pelagia* Dall, Bull. M. C. Z., IX. p. 61, August, 1881.

Habitat. Station 44, 539 fms., Gulf of Mexico, bottom temperature 39°.5 F. There seems to be no described species at all nearly related to this one.

Mangilia? exsculpta Watson.

Plate XV. Fig. 8.

Pleurotoma (*Drillia*) *exsculpta* Watson, Journ. Linn. Soc., XVI. p. 247, March, 1882.
Clionella exsculpta Watson, Chall. Gastr., p. 371, pl. xxiv. fig. 2, 1886.

Habitat. Yucatan Strait, 640 fms., fragment. Station 134, near Santa Cruz, in 248 fms., coarse sand, temperature, 56°.5 F. Challenger Expedition, 390 fms., ooze, north of Culebra Island, West Indies.

The nucleus of this species is white, glassy, globular and nearly smooth, composed of about two whorls not swollen beyond the size of those that follow them. It looks like the nucleus of *Taranis* on a larger scale, and is bigger than that of Mr. Watson's specimen as figured. But the difference is not sufficiently important to be of any systematic value.

Mangilia ? Pourtalesii Dall.

Plate IX. Fig. 6.

Pleurotoma (*Mangilia*) *Pourtalesii* Dall, Bull. M. C. Z., IX. p. 60, August, 1881.

Habitat. Bed of the Gulf Stream, Pourtalès, in 447 fms. Off Fernandina, Fla., in 294 fms., sand, temperature 46°.3, at U. S. Fish Commission Station 2668.

This is related to *M. exsculpta*, though easily distinguishable. If either is a *Clionella*, both seem likely to be. But both seem to me to want the siphonal fasciole of *Clionella*, and to be more probably Pleurotomoid or Mangilioid. The nucleus is globular, polished, smooth, of two rather large whorls. It resembles the most common form of the nucleus in *Drillia*, to which it may perhaps be removed when more is known.

Mangilia ? subsida Dall.

Plate XII. Fig. 3.

Pleurotoma (*Drillia*) *subsida* Dall, Bull. M. C. Z., IX. p. 62, August, 1881.

Habitat. Station 43, in 339 fms.

This comes nearest to *P. toreumata*, but is much stouter and more solid, recalling *Drillia Kennicottii*. The sculpture too is less varied and elegant. It is possible that its true place is near where I originally referred it rather than here, but I have preferred to put it next its nearest relation, conchologically, in the absence of any knowledge of the animal.

Mangilia toreumata n. s.

Plate XII. Fig. 8.

Shell seven-whorled, the nucleus lost, the fragment of it remaining is smooth and colored like the rest of the shell, a pale straw color; spiral sculpture (1) of a large undulate thread, or continuous series of undulations, flat behind, sloping forward, sixteen or seventeen on the whorl next to the last; these give the whorl a turrited appearance; (2) of a strong simple thread revolving a short distance in front of the suture and forming the posterior margin of the fasciole; (3) of a dozen or more similar threads on the last whorl, extending from the periphery, where the interspaces are wide, to the canal, where they are narrow; on the first three whorls of the spire none of these threads are visible; on the whorl next the last there are two between the suture and the shoulder of the whorl; transverse sculpture of rather strong, even, irregularly spaced, concavely arched waves, which cross the fasciole from side to side like a succession of irregularly huddled parentheses; also of a few faint ridges on the base due to incremental irregularities. Base subconic, slightly constricted for the canal; notch wide, squarely cut, rounded at the bottom, not touching the suture, a little deeper than wide; outer lip arched forward, thin, not lirate within; inner lip smooth, simple; pillar straight; canal short, wide, very slightly recurved, leaving a fasciole behind the pillar which is slightly obliquely trimmed off anteriorly; aperture long, narrow, shorter than the spire. Max. lon. of shell, 10.2; of last whorl, 6.0; lat. of shell, 4.0 mm.

Habitat. Station 176, near Dominica, in 391 fms., ooze, temperature 43°.5 F.

The sculpture of this shell is of remarkable elegance; its general form recalls *Genota*, but the aperture is rather short for that group.

Subgenus PLEUROTOMELLA Verrill.

Pleurotomella Verrill, Am. Journ. Sci., V. p. 15, Dec., 1872. Type, *Pleurotomella Packardi* Verrill, *l. c.*

This group is blind and without operculum; the teeth resemble those of *Bela*. The type has the *Sinusigera* nucleus, turbinate and beautifully obliquely reticulate, dark colored and differing in texture from the succeeding shell. It is short, inflated, and very thin, with a rather deep anal sulcus. It is impossible at present to say whether this assemblage of forms is homogeneous or should bear the name of *Pleurotomella*. Pending further knowledge of the nomenclature in this family and of the animals which have been referred to this subgenus, it forms a convenient resting place for a number of large archibenthal species having some characters in common.

Pleurotomella Packardi Verrill.

Pleurotomella Packardi Verrill, Am. Journ. Sci., V. p. 15, Dec., 1872; Trans. Conn. Acad., V. p. 453, pl. xliii. fig, 9, pl. lvii. fig. 1; VI. p. 265.

P. Packardi var. formosa Jeffreys.

Defrancia formosa Jeffreys, P. Z. S. 1883, P. 397, pl. xliv. figs. 9, 9 a, 9 b, 1883; Watson, Chall. Gastr., p. 349, 1885.

Pleurotomella Saffordi Verrill & Smith, Trans. Conn. Acad., VI. p. 151, pl. xxxi. figs. 4, 4 a, 1884.

P. Packardi var. Benedicti Verrill & Smith.

Plate XIV. Fig. 4.

? *Clathurella cala* Watson, Chall. Gastr., p. 361, pl. xxvi. figs. 21 a–c, 1885.

Pleurotomella Benedicti Verrill & Smith, Trans. Conn. Acad., VI. p. 148, pl. xxxi. figs. 2, 2 a, 1884.

Habitat. Station 235, off Bequia, in 1507 fms., ooze, temperature 39° F.

The typical form is thin, brown, with a somewhat depressed nucleus. The variety *formosa* has the sculpture stronger, and is a little thicker; the nucleus intermediate between the type and the variety *Benedicti*. The latter has the sculpture somewhat sharper, and is more elevated proportionally, the nucleus being taller and with one more whorl. The differences are not greater than those observed in other cases, both among the larval and the adult shells. I have compared typical specimens of all the named forms. The height and size of the larval shell depends upon its original size in the ovicapsule, where, it is well known, some individuals are much larger than others, and upon the length of time the animal continues in the larval state, which differs according to temperature and other factors of the environment. The differences spoken of by Jeffreys in the nucleus of his *Defrancia formosa* are well illustrated by the specimens in his collection, which are fully as variable as the adult shells, and, as far as depressed or elevated form is concerned, much more discrepant among themselves. In this connection I would refer to my introductory remarks, Part I. p. 183.

Pleurotomella leucomata Dall.

Plate XI. Fig. 13.

Pleurotoma (*Drillia* ?) *leucomata* Dall, Bull. M. C. Z., IX. p. 63, 1881.

Shell brilliant white, with a trochoid brown glassy nucleus of four whorls, the last of which has a sharp peripheral keel; subsequent whorls seven, with a peripheral row of (on the last whorl 14) short prominent subnodular waves which on the last two whorls tend to become a little elongated and oblique; they do not form ribs or pass on the last whorl before the periphery; between them and the suture the whorl is excavated somewhat and marked with very fine spiral grooves crossed by the arched incremental lines; over the nodules run a few small spiral threads, strongest on the early whorls; on the base are five or six flattened threads with wide interspaces, on the canal are about a dozen smaller threads, closely set; the whole surface appears polished and the fasciole smoooth; notch deep and wide, abutting on the preceding whorl at the suture; outer lip arched forward about a quarter of a turn, thin, simple; inner lip smooth, pillar short, obliquely twisted; canal wide, distinct, flaring at the end, slightly recurved; aperture narrow, shorter than the spire. Max. lon. of shell, 13.75; of last whorl, 8.2; lat. of shell, 6.0 mm.

Habitat. U. S. Fish Commission Station 2384, in the Gulf of Mexico between the delta of the Mississippi and Cedar Keys, Florida, in 940 fms., mud, temperature, 39°.6 F. Blake Station 48, in 533 fms., Gulf of Mexico, bottom temperature, 41°.75 F.

Though small, this is one of the most elegant of the American species, and does not accord in the details of its sculpture with any other known to me.

Pleurotomella Agassizii Verrill & Smith.

Pleurotomella Agassizii V. & S., Am. Journ. Sci., XX. p. 394, 1880; Trans. Conn. Acad. Sci., V. p. 454, pl. lvii. figs. 3, 3 a.

? *Pleurotomella Sandersoni* Verrill, Trans. Conn. Acad., VI. pp. 149, 266, pl. xxxi. figs. 3, 3 a, 1884.

This remarkably fine species, peculiar in its colored columella, is ruder and larger and more thick-skinned in the north; smaller, more elegantly sculptured, whiter, and with less epidermis in the Gulf of Mexico. This form, which rarely exceeds 25 mm. in length, and has the color on the pillar very faint or absent, may take the varietal name of *mexicana*. After a careful comparison of the young of this species with an authentic specimen of *P. Sandersoni*, I am much inclined to the opinion that the latter is merely a more slender variety with the transverse ripples on the anal fasciole finer and more numerous. I can see no other differences. The name may be retained in a varietal sense.

This form, though apparently not rare in the mainland archibenthal region, was not obtained among the Antilles on the Blake Expedition.

Pleurotomella Edgariana n. s.

Plate XXXVI. Fig. 6.

Shell large, straw-colored with a tinge of rufous about the margin of the anal sulcus outside; whorls 10–11 (seven remaining, nucleus and first normal turn broken away); whorls keeled or angulated at the periphery, the keel not riblike or sharp, but lightly rounded; in the first small whorls it is undulated or obscurely nodulous, but in the last four or five whorls not so; from it the posterior part of the whorl ascends to the suture almost in a straight line or section of a cone, the anterior slope is full and rounded; the anal fasciole is polished and marked only by the fine silky incremental striæ; the other transverse sculpture solely of fine incremental lines; spiral sculpture, beside the keel, of fine, rather angular threads (about seven in a space of 3.0 mm.) with a single finer thread generally present, on the last whorl, in the interspaces; these cover the whole shell, which appears when quite perfect to have a thin dark olive-colored epidermis, of which only traces remain on the type; aperture very large, the notch being one quarter of a volution in extent, very wide, and gently rounded into the outer lip, which is correspondingly curved forward; canal short, wide, hardly differentiated from the aperture; columella nearly straight, a broad (in the type specimen) rather thick marginated callus extending from in front of the notch around on the body, well around behind the columella, and so on to the canal; in the type the edge of the callus is somewhat thickened and raised, but this seems to be due to senile degeneration. Max. lon. of shell (tip lost), 58.0; of last whorl, 45.0; of aperture, 35.0; diameter at broken tip, 1.5; max. diameter, 25.0 mm.

Habitat. Station 2125 of the U. S. Fish Commission, near Curaçao, in 208 fms., sand, bottom temperature 51° F.

This fine shell in its simplicity of sculpture and wide sweep of the peristome from the notch along the outer lip is quite unparalleled by any of the known species. Its nearest relative is *P. Bairdii* Verrill, which is stouter, with a much shorter spire and coarser spirals, beside having a shallow notch, distinct transverse ribbing, and no distinct carina. *P. Edgariana* is much more spindle-shaped. It is named in honor of Mr. Edgar A. Smith, the well known conchologist of the British Museum. *Gymnobela engonia* Verrill, and some other forms which are considerably smaller, have somewhat the general aspect of this species, but all are stouter in proportion.

Pleurotomella Emertonii VERRILL & SMITH.

Plate X. Fig. 9.

Pleurotomella Emertonii V. & S., Trans. Conn. Acad., VI. p. 154, pl. xxxi. fig. 6, April, 1884.

Habitat. Station 121, between St. Thomas and Santa Cruz, in 2393 fms., gray globigerina ooze, bottom temperature 39°.5 F.

This fine specimen, which measured 34.0 mm. in length, is one of the most delicate and beautiful shells obtained by the expedition, and was obtained from the deepest water of any of the Blake shells.

Pleurotomella chariessa WATSON.

Pleurotoma (Defrancia) chariessa Watson, Linn. Soc. Journ., XV. p. 458, Nov., 1881.
Clathurella chariessa Watson, Chall. Brach., p. 352, pl. xx. fig. 6, 1885.
Pleurotomella Jeffreysii Verrill, Trans. Conn. Acad., VI. p. 411, pl. xliv. fig. 3, 1885.

Habitat. Station 163, off Guadelupe, in 769 fms., sand; Station 173, near the last, in 734 fms., ooze; Station 230, off St. Vincent, in 464 fms., fine sand; Station 236, in 1591 fms., ooze, near Bequia. Bottom temperatures 39° to 41° F. Also off Martha's Vineyard, in 1537 fms.; off Delaware, in 1168 fms.; east from George's Banks, in 1710 fms.; off North Carolina, in 731 fms., and off Jamaica, W. I., in 966 fms.; U. S. Fish Commission. North Atlantic sea-bed in 350 to 1125 fms., from western Europe to the American shores.

This is another one of those species which appear to luxuriate in variation, and which, if we had only material enough, would make the student pause to inquire what common criterion of species he is to adopt for conditions so different as those of the shallow water and the archibenthal forms respectively.

Among those forms in the collection before me which I regard as too closely connected to be separable as species, the following varieties can be recognized: —

Pleurotomella chariessa Watson, typical. From this Verrill's *Pl. Jeffreysii* cannot be separated.

Pl. chariessa var. *spica* Dall. Shell more slender and elongate, 58 × 18 mm., with eleven whorls, not counting the lost nucleus; 966 fms., Jamaica, W. I.

Pl. chariessa var. *phalera* Dall. Slender like the last; the transverse riblets fewer, longer, and stronger, the plaits in front of the suture on the anal fasciole fewer or obsolete; the canal shorter and wider; 38 × 14 mm.; nine whorls and the nucleus. Off Cape Fear, N. C., in 731 fms., ooze.

Pl. chariessa var. *tellea* Dall. Shorter, much like the typical form, but the transverse riblets and sutural plaiting strong only on the early whorls, absent or obsolete on the last two or three; the spiral lines absent or obsolete; the shell glossy; 29 × 11 mm.; six and a half whorls and the nucleus; with the preceding.

Pl. chariessa var. *aresta* Dall. Shell shaped like variety *phalera* but with the suture less excavated, and therefore looking more compact, the spiral sculpture more deeply cut, and the transvere riblets more elongated forward, a little more numerous and more distinctly defined; the canal is also a little narrower; 28 × 10 mm.; eight whorls and the nucleus; with the preceding.

It is possible that a good many conchologists might regard the above variations as of specific value, but I cannot bring myself to believe that they are equivalent to species or what we are accustomed to regard as species among shallow-water forms, where variation is more limited by the intensity of the struggle for existence.

Pleurotomella filifera DALL.

Plate XII. Fig. 9.

Pleurotoma (*Bela*) *filifera* Dall, Bull. M. C. Z., IX. p. 56, August, 1881.

Habitat. Station 47, in 331 fms., Gulf of Mexico.

This species is chiefly separated from *P. chariessa* by its stronger spiral sculpture and proportionally shorter canal. The nucleus also, though eroded, seems to have been considerably smaller than that of *chariessa* when perfect. A larger amount of material might perhaps connect the two, but I do not see my way clear to unite them at present.

There now follow a few species which are intermediate between *Pleurotomella*, especially such forms as *P. Bairdii* Verrill, and those called *Gymnobela* by Verrill. I am unable to see, either in the shells themselves or in the diagnoses, any differences of generic value between *Pleurotomella* and *Gymnobela*, except that the small and short stout forms are placed by Professor Verrill in the latter group. The animals have similar dentition, similar larval shells, and are similarly destitute of operculum and generally of eyes. It does not seem to me that they can be separated, except in a merely sectional sense. But so capricious are the characters, that, until each species has been thoroughly examined as to its anatomical relations, it will not be possible finally to determine its systematic place.

It is just as well here to call attention to a peculiarity which is liable to deceive students. The nuclear or larval shells of the *Pleurotomidæ* may be broadly classified in two groups. In one the shell is horny, dark colored, and in a very large number of cases has the pretty oblique reticulation of curved lines which distinguish what I have called, after Orbigny, the *Sinusigera* nucleus. In the other group the larval shell is glassy or porcellanous, much like the rest of the shell, except that it is usually more translucent. Both kinds of nucleus have a very similar series of subordinate modifications, of which one might construct a whole systematic classification. Neither sort of larval shell is confined to this family.

Now, after the larva has assumed the adolescent features of the species, the thin horny kind of nucleus is a weak point, easily abraded or drilled, and liable to decay. So, at an early stage, the animal begins to deposit a shelly layer inside of the horny one and closely imitating its coils, but of course smoothly rounded like the inside of the original shell, and always destitute of the external *Sinusigera* striation or other sculpture. It often happens that the shell is filled solidly with the new deposit, and that the horny envelope decays, leaving no trace, while there will be no sign of erosion, and the internal deposit will have all the effect of being an original nucleus of the shelly sort. This being accomplished, it only needs a few of the superficial variations of sculpture and relative slenderness to make very fair grounds for the description of a new species. "It has such and such differences," the observer will reason, "but above all the nucleus is totally distinct." As the writer has been several times nearly taken in in this way, he thinks a warning may be useful for others.

? Pleurotomella catasarca n. s.

Shell small, fusiform, compact, with a turbinate *Sinusigera* nucleus of three whorls and seven succeeding whorls, a keeled periphery and no ribs; exterior pale straw-color with darker axially directed cloudings, following the incremental lines; spiral sculpture of a well-marked but not sharp-edged keel at the periphery, which on the earlier whorls is minutely undulated; the fasciole extends forward from the suture nearly to the keel, but falls short a little, and is bounded by an obscure, little elevated ridge parallel with the keel, marked by one or two especially prominent fine revolving threads; the whole space between the keel and the suture behind it is covered with these fine threads with slightly wider interspaces, and crossed by delicate arched ripples, neatly and uniformly spaced. In front of the keel the spirals are divisible into primary (10–15) and secondary; the latter, much finer than the others, run in the interspaces in groups of two or three in each interspace, except on the canal, where the threads become nearly uniformly coarse. Whorls preceding the last extending in a nearly straight line from the keel to the suture before and behind, the incremental lines distinct but not coarse; suture simple, not appressed; base neatly rounded, canal moderately long and wide; sinus rather deep, outer lip arched forward, thin, sharp; inner lip with a thin layer of white callus; pillar and canal nearly straight. Max. lon. of shell, 20.25; of last whorl, 13.25 ; max. lat. of shell, 9.0 mm.

Habitat. Station 117, off Porto Rico, northward, in lat. 17° 47′ N. and lon. 67° 3′ W., in 874 fms., gritty ooze, bottom temperature 40°. Station 291, near Barbados, in 200 fms., stony bottom, temperature 50°.0 F.

This shell recalls *Surcula gonioides* Watson, but is more compact, with a proportionally shorter last whorl and canal ; the young of *Pleurotomella Edgariana* Dall has fewer whorls in the same length ; *Typhlomangelia Tanneri*, which has a good deal the same general form, is ribbed, has the fasciole more excavated, and the keel or shoulder behind the periphery. In fact, I have not been able to find anything which closely resembles it among figured species, and its nearest relative seems to be the next species.

? **Pleurotomella hadria** n. s.

Shell resembling the preceding in its general features, but larger and stouter, and differing in details of sculpture, etc. It is best described by comparing it with the *P. catasarca.* The nucleus is similar and there are seven subsequent whorls; the keel is less prominent, there is a narrow shallow groove behind it, and then two sharp threads marginating the fasciole, which are more distinct on the earlier whorls ; the spiral threads on the fasciole are crossed, as in *P. catasarca*, by fine arched ripples, but in *P. hadria* these ripples are more numerous, finer and closer together, they follow the incremental lines, and, as the sinus is less profound in *P. hadria,* they are less deeply concave; one of the most marked differences is a series of small oblique riblets, which begin in front of the fasciole or on the keel itself, especially on the earlier whorls, cutting its continuity, and continued obliquely in front of it nearly or quite to the suture as threads reticulating the spirals; this feature becomes obsolete on the last whorl or half-whorl, and is stronger in archibenthal specimens from the Gulf of Mexico than in those from off the Carolina coast ; on the base of *P. hadria* the threads are hardly divisible into two series, and the alternations of size are very slight, and occur in every other thread if at all, instead of several fine ones intercalated between two primaries ; the aperture, roundness of the base, outer lip, etc., are much as in *P. catasarca*, but the notch is not so deep, the pillar is not quite so straight, and the canal is a little twisted and plainly somewhat recurved. Max. lon. of shell (of same number of whorls as the specimen previously described under *P. catasarca*), 27.0 ; of last whorl, 19.0; max. lat. of shell, 13.0 mm.

Habitat. U. S. Fish Commission Stations 2676, off Cape Fear, N. C., in 407 fms., sand, temperature 45°.8; 2678, in the same vicinity, in 731 fms., ooze; and 2383, in the Gulf of Mexico, in 1181 fms., mud, between the delta of the Mississippi and Cedar Keys, Florida.

The Gulf specimens, as usual, show a thinner and more glistening epidermis over a sharper and more delicate sculpture and a thinner shell. *Gymnobela engonia* Verrill may belong in this vicinity, but it has much more the aspect of a genuine *Bela*.

Section GYMNOBELA Verrill.

Pleurotomella (Gymnobela) extensa Dall.

Plate X. Fig. 2.

Pleurotoma (*Bela*) *Blakeana* var. *extensa* Dall, Bull. M. C. Z., IX. p. 55, August, 1881.
Pleurotoma (*Defrancia*) *streptophora* Watson, Linn. Soc. Journ., XV. p. 464, Nov., 1881; Chall. Gastr., p. 366, pl. xix. figs. 8 a–b, 1885.

Habitat. Yucatan Strait, off Cape San Antonio, in 640 fms.; Gulf of Mexico, Station 35, in lat. 23° 52′ and W. lon. 88° 58′, in 804 fms., bottom temperature 40°.5 F. Challenger Expedition, North Atlantic, in over 1000 fms. Station not noted.

It will seem extraordinary to many conchologists, that in my preliminary paper I separated this form and the one which follows only as varieties. The extremes look very unlike, but I separate them for convenience, and not because I am at all certain that all these *Gymnobelæ*, excepting *G. engonia* Verrill. and *G. lottæ* Verrill, do not belong to one and the same species. The single characters which, in general, are common to them all, may be all or only in part exhibited, may be absent, or each single character may be weak or intensified in strength, and the combinations of a few sculptural elements in this way may exhibit an incredible number of forms, which in total, until carefully analyzed, will seem very different from each other. The absence of struggle which characterizes life in the deeps as opposed to that of the shores, and which is illustrated by the absence of the protective operculum in so many species, does not limit the variations of external form as they are limited by economical and other reasons where the struggle is intense. In estimating the archibenthal fauna this must be steadily kept in view.

Pleurotomella (Gymnobela) Blakeana Dall.

Plate X. Fig. 1.

Pleurotoma (*Bela*) *Blakeana* var. *normalis* Dall, Bull. M. C. Z., IX. p. 54, August, 1881.
Gymnobela brevis Verrill, Trans. Conn. Acad., VI. p. 417, pl. xliv. fig. 8, 1885.

Habitat. Yucatan Strait, 640 fms. Gulf of Mexico, at Station 43, in 339 fms., mud, off Tortugas, bottom temperature 40°.0 F.; Station 136, near Santa Cruz, in 508 fms., soft ooze, temperature 42°.5. U. S. Fish Commission, off

George's Bank, off Nantucket Shoals, off Maryland, and off Hatteras, North Carolina, in 100 to 1608 fms.

In the typical form the transverse riblets are sharp-edged, the spirals are faint or tend to become so, the spire is low, and there is a tendency to coronation or the formation of a wrinkled band in front of the suture. When perfect, the notch is quite shallow, as in *Bela*. The epidermis is pale, glistening, and smooth.

Pleurotomella (Gymnobela) Blakeana var. agria Dall.

Shell in general resembling *P. Blakeana*, but differing by more elevated spire, by the much stronger closely set spiral threads, which cover the whole shell, by the rounder and more oblique riblets confined to the vicinity of the angulation in the adult and nearly absent on the spire, and the columella so arched and twisted as to make the axis nearly pervious. The epidermis is rougher and darker than in the type and there are six whorls without the nucleus. Lon. of shell, 10.0 ; of last whorl, 7.5 ; lat. of shell, 6.0 mm.

Habitat. U. S. Fish Commission Station 2723, 125 miles off the mouth of Chesapeake Bay, in 1685 fms., gray ooze.

The typical form and a specimen of this well-marked variety were collected together.

A much larger shell with the surface much eroded was collected by the Blake at Station 173, in 734 fms., near Guadelupe. In this the general form has become more oval, the angulation a sharp keel forming a notch in the outer lip, and when perfect probably marked with vaulted scale-like projections. There is a sulcus in front of this keel. The slope from the suture to the keel is much steeper than in var. *agria*, and even a little rounded. Before the sulcus the whorl is covered with coarse primary threads, over and among which are a finer secondary series. The columella is callous and twisted, there is a short but evident canal, slightly recurved, and followed by a siphonal fasciole. The transverse riblets appear to have been well marked only on the periphery. There are five whorls, but the apex is eroded; there were perhaps two and a half more beside the nucleus. I regard this as probably the adult form of the var. *agria*, but it is too imperfect to decide with certainty.

Pleurotomella (Gymnobela?) tornata Verrill
var. Malmii Dall.

Taranis Morchii Dall, Bull., M. C. Z., IX. p. 70, 1881; Verrill, Trans. Conn. Acad., V. pp. 486, 487, 1882; not of Jeffreys.

Habitat. Station 2, in 805 fms.

This is the form with subspinose sculpture. The variety with the spiral sculpture strongest is the variety *tornatus* Verrill (*op. cit.*, VI. p. 251, 1884), and his varietal name will have precedence, since the shell is not the *Taranis Morchii* as we supposed. See under the head of *Taranis cirrata* Brugnone, immediately following.

Subgenus TARANIS Jeffreys.

Taranis cirrata Brugnone.

Pleurotoma cirratum Brugnone, Mem. Pleur. Fos., p. 17, fig. 9, 1862.

Trophon Morchii Malm, Götheborgs Vet. Samml. Handl., 1863, p. 130, pl. ii. fig. 15, 1863.

Bela demersa Tiberi, Journ. de Conchyl., XVI. p. 179, 1868.

Taranis Morchii Jeffreys, Ann. Mag. Nat. Hist., V. p. 10, 1870.

Taranis cirrata Monterosato, En. e Sin. Med., p. 41.

Habitat. U. S. Fish Commission Station 2602, in 124 fms., sand, off Cape Hatteras, N. C. Also off Fowey Rocks, Straits of Florida, in 150–200 fms., Dr. Rush.

This is not the shell referred to under the name of *Taranis Morchii* in my Preliminary Report. Nor is it the shell called *Taranis Morchii* by Prof. Verrill in Trans. Conn. Acad., V. pp. 486, 487, 1882.

I have carefully studied the types of the genuine *Taranis* in the Jeffreys collection, including original types of Jeffreys, Brugnone, Tiberi, Malm, Monterosato, etc. They all belong to one species, characterized among other things by a swollen smooth white bulbous nucleus of about two whorls, which when the shell is young and thin sometimes shows brownish from the contained animal matter. It recalls the nucleus of some species of *Sipho*, which was doubtless the reason Malm referred it to *Trophon*.

As I have not seen Prof. Verrill's types, I cannot say whether his specimens are all of one species, but presume they are, and in their characters they agree very well with the single specimen dredged by the Blake, which has the usual brown *Sinusigera* nucleus of so many *Pleurotomidæ*. It has very much the sculpture of *T. cirrata* or *Morchii*, but the transverse sculpture is as strong as the spirals and tends to become prickly at the intersections. A variety of this form with the spiral sculpture predominant is the *Taranis Morchii* var. *tornatus* of Verrill, Trans. Conn. Acad., VI. p. 251, 1884. Both of these probably belong to *Mangilia*, somewhere in the vicinity of *Pleurotomella* or *Gymnobela*, and the former is referred to above as *Pleurotomella* (*Gymnobela* ?) *tornata* var. *Malmii* Dall.

The name of *cirratum* given by Brugnone to this species is not preoccupied by *Pleurotoma cirrata* of Bellardi, as the latter is a genuine *Pleurotoma* and not a *Mangilia*. As it is a year older than Malm's name, I follow Monterosato in giving it precedence. The brown color of the nucleus of his *Bela demersa*, referred to by Tiberi, is, according to his specimen in the Jeffreys collection, an accidental tincture due to a deposit of extraneous matter, perhaps iron oxide.

February 16, 1889.

Genus CANCELLARIA Lamarck.

Cancellaria reticulata Linné.

Voluta reticulata Linné, S. N., XII. p. 1190, 1767.
Cancellaria reticulata Lamarck, Prodrome, p. 71, 1799; An. s. Vert., VII. p. 112, 1822; Sowerby, Thes., II. p. 442, pl. xcii. fig. 17, 1848.

Habitat. South Carolina (Gibbes and Ravenel) to West Indies. Sarasota Bay, Sanibel Island, Punta Rasa, Long Key, and Charlotte Harbor (Stearns, Hemphill, Mastin, and others). Nassau, N. P., U. S. Fish Commission. West Florida, 30 fms., (a fragment,) U. S. Steamer Bache.

This is the type and most common species of the genus. It is abundant in South and West Florida, and somewhat less so on the shores of the Antilles. It is reported from the Pliocene and Post-pliocene by Tuomey and Holmes, and is found rarely on the coast of the Carolinas. The fossil *Cancellaria depressa* of Tuomey and Holmes is hardly more than an extreme variety of this species. Their *C. venusta* of the Pliocene beds is evidently a different thing. So is the Pliocene *C. Conradiana* Dall, from Florida, a slender form, of which the Fish Commission seems to have dredged a few fragments in a recent state; but the *C. venusta* of Holmes in the Post Pliocene volume is not a *Cancellaria* at all, but a *Tritonidea*, probably *T. cancellaria* Conrad. Beside these there are only six recent species of *Cancellaria* proper yet known from the Antillean region. These are *C. reticulata*, *C. rugosa* Lamarck, *C. tenera* Philippi, and three others discovered recently by the Fish Commission.

I find among some shells supposed to be from Nassau, New Providence, two specimens of *C. similis* Sowerby, and one of *C. piscatoria* Gmelin, both West African species and probably adventitious. I think it worth mentioning, however, for one would expect to find some West African species on the outer line of the Antilles. *C. rugosa* has obstinately been referred to China by the Monographers, except Tryon, but it is a rather common West Indian species. Perhaps it has a Chinese analogue with which it has been confounded. *C. Stimpsoni* Calkins is a very distinct form, somewhat analogous to *C. bullata* of West America, but the species described from Yucatan by Philippi under the name of *C. tenera*, from the description, must be very like it. It has not been figured, but, if identical with *C. Stimpsoni*, as I believe it to be, Philippi's name has many years priority.

Subgenus TRIGONOSTOMA Blainville.

Trigonostoma Smithii Dall.

Plate XXXVII. Fig. 1.

Cancellaria Smithii Dall, Agassiz, Three Cruises of Blake, II. p. 70, fig. 292, 1888.

Shell reddish brown, turrited, scalar, with 8–9 corded varices; the interior of the aperture darker and redder, the outer lip arched, sharply internally lirate;

pillar lip with a moderate callus and about the middle two strong plications; anterior notch shallow; umbilicus none in young shells, and very small in adult specimens. This shell has a depressed polished brown nucleus of about two and a half whorls, and our largest specimen has four sculptured whorls with about (on the last whorl) nine rounded strong varices crossing the whorl. At the beginning of the last whorl there are about eight spiral strong threads between the sutures, equally strong on and between the varices; there is also a single fine thread between each two coarse ones. The epidermis is coarse, fibrous, and dehiscent. The sutures are very deep, the mouth ovate trigonal, with about eight strong liræ within the outer lip and two well-marked plaits on the inner lip; the margin of the aperture is continuous; there is a very small umbilical chink in the adult, but none in the young. The throat is of a ruddy brown. The largest specimen measures 10.5 by less than 6.0 mm., and the aperture less than 5.0 mm. in length.

Habitat. U. S. Fish Commission Station 2610, living, in 22 fms., sand, off Cape Lookout; and at Station 2596, seventeen miles E. S. E. from Cape Hatteras, North Carolina, in 49 fms., sand, bottom temperature 75°.0 F.

This interesting species is named in honor of Mr. Sanderson Smith of the U. S. Fish Commission. It is related to the Miocene *C. scalatclla* Guppy, from which it is distinguished by its more attenuated form, fewer varices, and smaller aperture. It differs from *C. funiculata* Hinds, by the continuous spiral striæ between the varices, greater attenuation, and its chestnut (fading to a lighter) brown color. *C. minima* Reeve is very like it, but wants the very deep sutures, is smaller, and has a larger number of varices.

Trigonostoma Agassizii n. s.

Plate XXXV. Fig. 4.

Shell small, orange brown, turrited, six-whorled; nucleus finely irregularly reticulated, polished, nearly smooth, of one and a half whorls; adult with (on the last whorl) about fourteen small even little-elevated ribs, which pass clear over the whorl, and are sharply nodulous on the edge of the shoulder of the whorl, which they cross obliquely to the suture; beside these there are very evident crowded incremental lines which reticulate the finer spirals; spiral sculpture of on the last whorl eight or more primary spirals, with finer and still finer intercalary threads, the primary ones somewhat swollen as they override the ribs. The whorls are strongly shouldered in front of the suture, the shell being covered when fresh with a hispid epidermis; tufts of this stand up from the nodules on the carina of the whorl, coronating the shell; aperture subpentagonal, orange brown, outer lip internally lirate, rather thin; anterior notch quite small, pillar excavated in the middle, bearing three strong folds, a moderate callus on the body; siphonal fasciole distinct, arched, but the umbilicus a mere chink, hardly perceptible in the young. Lon. of shell, 13.5; of last whorl, 9.5; of aperture, 7.0; max. lat. of shell, 8.3 mm.

Habitat. U. S. Fish Commission Station 2607, off the Carolina coast, in 18 fms., sand, temperature 73°.5; and Station 2373, in the Gulf of Mexico, in 25 fms., coral, between the delta of the Mississippi and Cedar Keys, Florida.

This little species belongs to the same general group as *C. minima* Reeve, *C. Smithii* Dall, and *C. subangulata* Scacchi, but differs by good characters from them all. It has one more columellar fold than *C. Smithii*, which has fewer and corded varices and no carina on the shoulder of the whorl. Its nearest relative is the Miocene *C. scalarina* Conrad (non Deshayes) which is less turrited and has a different pillar.

Cancellaria (Trigonostoma?) microscopica n. s.

Shell minute, five-whorled; upper whorls gray, the last whitish; nucleus inflated, glassy, polished, remaining whorls shouldered near the suture; last whorl spirally sculptured with subequal rather coarse threads (which on the preceding whorls alternate large and small) crossed by evident little elevated lines of growth; the earlier whorls are crossed by small rounded riblets, most evident at the shoulder, which become obsolete on the last whorl; umbilicus distinct, moderate, with no bounding carina or siphonal fasciole; aperture rounded behind and hardly angular in front, the outer lip faintly lirate within, not thickened; the inner lip moderately callous with one (or more?) extremely faint folds about the middle; epidermis hispid, thin, yellowish. Max. lon. of shell, 4.3; of last whorl, 3.3; of aperture, 2.0; max. lat. of shell, 2.0 mm.

Habitat. Campeche Bank, off Yucatan, in 200 fms., and off Cuba, in 780 fms., mud, Dr. W. H. Rush, U. S. N. Station 2668, off Fernandina, Florida, in 294 fms., sand, U. S. Fish Commission.

This is probably the smallest species known, and, notwithstanding the faintness of the folds, which may be an incident of its stage of growth, it has the aspect of a *Cancellaria* rather than an *Admete*. Its nearest ally is perhaps *C. minima*, which has a different sculpture, no umbilicus, and is about twice as large. *C. subangulosa* S. Wood, an Eocene fossil, now living in the waters of Madeira and the Canary Islands, is more elongated in the spire and has a proportionally smaller body whorl; it is strongly ribbed, red brown in color, and has a well-marked siphonal fasciole. It is but little larger than the present species. None of the Italian Tertiary forms appear closely related to the present species. *Admete nodosa* Verrill is totally different, and perhaps not even an *Admete;* and the northern species need not be compared with *C. microscopica*.

Of species erroneously referred to this region are the West American *C. brevis, corrugata,* and *tessellata; C. scalarina* Reeve, or *Thomasiana* Crosse, is Chinese, and *C. Candeana* Orbigny is a young *Phos.*

Genus BENTHOBIA Dall.

Shell smooth, short-spired, resembling *Admete*, or an imperforate smooth *Trichotropis,* with a broad concave columella destitute of plaits, shorter than the aperture, and not forming a canal; outer lip sinuous but not notched; epidermis thin and smooth. Soft parts ?

Type, *Benthobia Tryonii* Dall.

Benthobia Tryonii n. s.

Plate XXXV. Fig. 6.

Shell with a pale brown, thin smooth epidermis, under which is a thick easily eroded chalky layer, recalling that of some fresh-water shells; spire short, eroded in all the specimens, but seemingly originally acute; whorls about six, exclusive of the (decollate) nucleus, full, rounded; sculpture of sinuous lines of growth, not disturbing the polish of the surface, and faint microscopic spiral scratches; in front of the suture the margin of the whorl is pinched up into ten or twelve obliquely radiating short waves, which may be either sharp-edged or flattened, and become obsolete toward the end of the last whorl; they are slightly constricted near the suture; base rounded, without any umbilicus or siphonal fasciole; the eroded apices seeming perforate, it is possible that the very young may be umbilicate; aperture longer than wide, pointed behind and in front, but not canaliculate; outer lip simple, receding from the suture, then running parallel with the axis for a short distance, then again receding and arching round in front of the end of the pillar; inner lip callous; columella thick, broad, concavely arched, subtruncate and rounded at the end, behind which is a shallow groove and in front of which the peritreme is extended in a rounded point. Lon. of shell (tip eroded), 13.0; lon. of last whorl, 10.0; lat. of shell, 7.5 mm.

Habitat. U. S. Fish Commission Station 2678, off Cape Fear, North Carolina, in 731 fms., ooze, bottom temperature 38°.7 F.

This is a very remarkable shell, with its brownish smooth surface and eroded chalky substratum it recalls a fresh-water animal and its aperture resembles to some extent that of *Pyrgulifera* or *Melanopsis*, but there is no canal. It is somewhat like *Trichotropis* except that it is smooth and has an arched columella. It recalls *Cancellaria* or *Admete*, but has no umbilicus and is perfectly destitute of plaits on the axis. It is impossible to determine its place until the soft parts are known, but it is equally impracticable to place it in any known genus from the shell characters. I suspect it is related to *Admete*, and leave it temporarily in that vicinity. *Tritia integra* Conrad, also referred by him to *Buccinum* and to *Bulliopsis* (subgenus of *Nassa*), from the Calvert Cliffs Miocene of Maryland, may perhaps belong to this group, but I have not seen an authentic specimen and judge chiefly from the figure in the Proceedings of the National Institute, Plate III. Fig. 5, 1842.

It is dedicated to the memory of that indefatigable conchologist, the late G. W. Tryon, Jr.

Super-Family RHACHIGLOSSA.

The connection of this group with the Toxoglossa has been already shown to be intimate, as illustrated by the radula of *Spirotropis*, at once Toxoglossate and Rhachiglossate. Doubtless the two series should be combined under one head, and thus opposed to the Tænioglossa. But until more is known, I prefer to leave the nominal arrangement undisturbed.

FAMILY OLIVIDÆ.

Genus OLIVA BRUGIÈRE.

Oliva reticularis LAMARCK.

Oliva reticularis Lam., Ann. du Muséum, XVI. p. 314. Tryon, Man. *Oliva*, p. 83, pl. xxx. figs. 90–100, 1–4.

A fresh specimen was obtained in 73 fms., at Station 290, near Barbados, and a young dead specimen in 54 fms., near the island of Sombrero.

This beautiful shell lives in the sand, for the most part too deep to be reached by the trawl, which may explain their comparative absence from the collection while so common in the region visited.

Oliva litterata LAMARCK.

Plate XXXIV. Figs. 8 a–o, 8′.

Oliva litterata Lam., Ann. du Muséum, XVI. p. 315; Say, Am. Conch., III. p. 152, 1830.
Oliva Sayana Ravenel, Cat., p. 19, 1834.

Fragments occurred in several dredgings, but the species lives in shallow water, on sand flats.

Genus OLIVELLA SWAINSON.

Olivella mutica SAY.

Plate XXXIV. Figs. 1 a–r, 2.

Oliva mutica Say, Journ. Acad. Nat. Sci. Phil., II. p. 228, 1822.
Olivella zonalis Conrad, Journ. Acad. Nat. Sci. Phil., VII. p. 153, 1834.

This species occurs in fragments, evidently disgorged by fishes in deep water, but lives only on the shores, in shallow sandy places.

The animal has the posterior filament to the mantle, like *Oliva*, but wants eyes and tentacles, while possessing an operculum which is denied to *Oliva*. According to Stimpson, there does not seem to be any proboscis in *Olivella* *mutica,* or else it is extremely short. It is very voracious, and will swallow whole a young mussel one third its own length. The respiratory siphon resembles that of *Oliva.* The species occurs from Cuba to North Carolina, and is fossil in the Post-pliocene of our Atlantic coast.

Olivella fuscocincta Dall.

Olivella nitidula Dillwyn (Tryon, Man., p. 64), var. ? ?

It is evident that nothing but a study of a much larger series of individuals of each species than has yet been discussed will have to be made before we can define the species of *Olivella.* Meanwhile, though of the *nitidula* form, I can find nowhere any figure or description corresponding to this shell, while the (some fifty) specimens which have been examined show hardly any trace of variation among themselves except what is evidently due to differing stages of growth. I have come to the conclusion that it is best to name it.

Shell stout, subcylindrical, short-spired; form about that of Fig. 298 in Sowerby, Thes. Conch. Mon. *Oliva,* by Marrat; free from any spots, streaks, or zigzag markings whatever; body pale fawn-color, with a white revolving band about two fifths of the way from the suture to the anterior end of the shell; this band is always present, and in some specimens another fainter one is visible anterior to the former; the nucleus, the anterior edge of the suture, the posterior edge of the outer fasciole, and the callosities of the mouth, are translucent white; the callus on the spire and the anterior part of the outer fasciole are uniform dark brown; the interior fasciole or anterior callus is white with from two to five ridges, in the gap between this and the posterior callus are about five ridges, while the posterior callus is smooth. Lon. of shell, 10.0; of aperture, 8.0; max. lat. of shell, 5.0 mm.

Dredged at Barbados, in 100 fms., and near by, at Stations 273 and 292, in 103 and 56 fms.; at Station 36, in 84 fms.; at Station 147, near St. Kitts, in 250 fms. There were apparently living specimens in all of these hauls; the bottom temperature varied from 52°.5 to 74°.5 F. at the stations mentioned.

Olivella jaspidea Gmelin.

Voluta jaspidea Gmel., S. N., p. 3442, No. 21, 1788.
Oliva conoidalis Lam., An. s. Vert., VII. p. 437, 1822.
Olivella exigua "Martini," Marrat, Sby., Thes. *Oliva,* p. 33, pl. xxiii. figs. 399–401, 1871.
Cylinder tenuis, longus exiguus, variis coloribus, etc. Martini, Neues Syst. Conch. Cab., II. p. 186, pl. l. fig. 556, 1773.

Variety *rotunda.*

Among the specimens brought back by the Blake were a number belonging to what, for safety's sake, it is more prudent to call a variety of *Olivella jaspidea,* as it goes through much the same series of color varieties, and, excepting the absence of spots or dots, has much the same color markings. It differs from the typical form in having a much shorter spire, a stouter olive-seed-like form, and especially in the denticulation of the body callus, which, beginning anteriorly, has two strong and a number of small not very regular ridges, behind which is a marked depression, and then an even uniform series of about ten fine ridges, the posterior of which is on the same line as the most posterior edge of the outer fasciole ; the callus, throat, and nucleus are white ; the size is larger than that of any *jaspidea* I have been able to find, and the shape is that of *O. fuscocincta* on a giant scale. The colors are usually pale, the whorls transversely streaked with rather broad soft lines of pink or brown, which vary from straight to zigzag, or may be more or less broken ; the glaze of the fasciole and spire tends to brownish. Lon. of two specimens, 22.6 and 25.0 mm.; of the aperture of the same, 16.6 and 17.0 mm. ; max. diam., 10.2 and 10.5 mm. They are very thick and solid, but most of the specimens are smaller.

Dredged by the Blake at Station 2, in 805 fms. ; Station 57, in 177 fms. ; Station 20, in 220 fms. ; Station 36, in 84 fms. ; Station 34, in 400 fms. ; all near Cuba; Station 132, 115 fms., off Santa Cruz ; and Station 147, in 250 fms., near St. Kitts ; Station 167, in 175 fms., off Guadelupe; Stations 248, 259, and 262, near Grenada, in 161, 159, and 92 fms. ; in 72 fms., near Sombrero ; and at Stations 261, 272, 273, 282, and 299, near Barbados, in 340, 76, 103, 154, and 140 fms. ; the bottom temperatures ranging from 40° to 65° and averaging 57° F. Some very zigzag-marked specimens were obtained at Station 152, in 27 fms., bottom temperature 67°.5 F.

Some of the specimens were almost white, none of them showed any very dark coloration; the most intense markings were, as usual, the terminations of the transverse lines just in front of the suture, where there is a tendency to form a band of fasciculated streaks, as in many Olivellas.

Olivella bullula Reeve.

Olivella bullula Reeve, Conch. Icon. *Oliva,* pl. xxx. fig. 96.

A few poor specimens were obtained at Station 5, in 229 fms. ; Station 50, in 119 fms. ; and Station 20, in 220 fms. ; all off Cuba; also off Sombrero Island, in 72 fms., living ; and at Station 230, near St. Vincent, in 464 fms., sand.

These specimens were all poor, and only by studying them in connection with material from the same region in better condition, brought by the U. S. Fish Commission, could anything be made of them. Though varying much in characters, in the present confused state of the genus it is perhaps most advisable to refer them to this species. The differences between the different stages of growth in *Olivella* require much study, and are doubtless of much importance. Differences in proportion of the length of the spire to the whole length, in stoutness or slenderness, and in color, may occur within the same species to a very marked extent. As soon as we can determine the differences due to growth-stages in one or two species, it will become much easier to assign a place to some at present very puzzling forms.

Olivella (*bullula* var. ?) *tubulata* Dall.

This form varies from moderately stout, or a little more slender than Reeve's figure, to extremely attenuated. It is in the last case about the shape of *O. nympha* Adams & Angas, but more cylindrical, pure white, the walls and spire sometimes translucent; the broader form recalls *O. floralia* (Duclos) Tryon, from the white varieties of which it is at once distinguishable by the large size of its nuclear whorls. The soft parts dried up in one specimen show no sign of an operculum. The slender form is 11.3 mm. long and 3.5 mm. in greatest diameter, with five whorls. The length of the aperture is almost exactly half that of the shell. The stouter form is 13.3 mm. long, 5.0 mm. in diameter, with five whorls, and the aperture 8 mm. in length. The suture in both is deeply channelled, except between the two nuclear whorls, which are rounded and flattened on the summit. A specimen was obtained at Station 20, in 220 fms., off Cuba, and another by the Fish Commission in 225 fms., off the northeastern end of the same island.

FAMILY MARGINELLIDÆ.

Genus MARGINELLA.

This group has been absurdly over-divided. The species melt into one another, as it were, as soon as plenty of material is brought together; so that most of the subgenera quietly efface themselves. For the species of the Blake Expedition, which comprise only a small part of those native to the region, I adopt for the occasion the following subgenera: —

Marginella, with Sections *Volvarina* and *Volutella*; *Persicula*, with Section *Gibberula*.

Marginella apicina MENKE.

Marginella apicina Mke., Syn. Moll., p. 87, 1828.
Marginella conoidalis Kiener (1840), Auctorum.
Marginella caribæa Orbigny, Moll. Cuba, II. p. 97, pl. xx. figs. 24–26, 1845.
Marginella livida Hinds, P. Z. S. 1844, p. 73.
Marginella flavida Redfield, Ann. New York Lyc. Nat. Hist., IV. p. 163, pl. x. fig. 4 a–b, 1846; Cat. Marg., p. 223, 1870.
?*Marginella borealis* Verrill, Trans. Conn. Acad.

One specimen of this common West Indian form was collected by the Bache in 100 fms., south of Inagua Id., Bahamas, 1872.

Specimens of undoubted *apicina* have been collected by the U. S. Fish Commission near Cape Hatteras, in 1885, which fact renders it highly probable that Verrill's *borealis* is at most a northern race of this protean species, or of *M. limatula* Conrad. The specimens I have seen seem intermediate between these two.

Marginella Watsoni Dall.

Plate XIX. Fig. 3. Plate XXXVIII. Fig. 2.

Marginella Watsoni Dall, Bull. M. C. Z., IX. p. 71, Aug. 25, 1881. Agassiz, Three Cruises of the Blake, II. p. 70, fig. 290, 1888.

Habitat. Sigsbee, off Havana, 480 fms.; Station 2, 805 fms.; bed of the Gulf Stream, Pourtalès, 447 fms.; Yucatan Strait, 640 fms.; Station 20, 220 fms. (young).

Although taken at several stations, this species appears to be rare, and in most cases was represented by a single specimen, or by fragments only.

Marginella amabilis Redfield.

Marginella amabilis Redfield, Ann. N. Y. Lyc. Nat. Hist., V. p. 225, 1852; Cat. Marg., p. 246, 1870, note.

Marginella carnea Sby., not Storer, Thes. Conch., I. p. 398, pl. lxxvi. figs. 102, 114, 1846.

Marginella oblonga (Swains.) Auct., in part.

Habitat. Sand Key, 125 fms.; off Sombrero Island, 72 fms.; Sigsbee, off Havana, in 119 fms.

This seems, as Mr. Redfield suggests, sufficiently distinct from *M. rostrata* and *oblonga* to retain its separate name.

Marginella rostrata Redfield.

Marginella rostrata Redfield, Am. Journ. Conch., VI.; Cat. Marg., p. 246, note, 1870.

Marginella oblonga Sby., pars, Thesaurus, pl. lxxvi. figs. 106, 107.

Habitat. Station 36, in lat. 23° 13′ N. and lon. 89° 16′ W., Gulf of Mexico, north of Yucatan, in 84 fms.; bottom temperature 60° F.

This seems a well-characterized form, and among the specimens compared there did not seem to be any intermediate specimens as between this species and *amabilis* or *oblonga*.

Marginella cassis n. s.

Plate XXXV. Fig. 8.

Shell cassidiform, smooth, white or pale flesh-color, with a brown spot just above the posterior sinus, the anterior edge of the anterior sinus brown, and three faint touches of brown above and outside of the callus of the outer lip. There are also opaque streaks or delicate lineations coincident with the lines of growth and very perceptible under a lens. Nucleus translucent whitish, rather blunt; shell with five and a half turns; spire depressed conical, sutures distinct; columella with four strong squarely cut plaits diminishing backward; columella lip with a heavy white callus, forming a prominent lump on the inner side of the posterior sinus; outer lip considerably thickened, with a sulcus above and outside of the callus, extending backward as far as the tip of the spire; posterior sinus deep; outer lip with its inner edge irregularly transversely grooved and with numerous rounded denticles; nearly parallel with the body whorl, and with the anterior sinus shallow. Length of shell, 15.00; greatest width of shell, 11.20; width of aperture in adult, 1.75 mm.

Habitat. Station 45, in 101 fms., Gulf of Mexico, west of the Tortugas, in lat. 25° 33′ N., lon. 84° 21′ W., bottom temperature 61°.75 F.

This species is readily recognized by its triangular form, callous Cypræa-like aperture, and denticulated outer lip. I have not been able to find figured any species which seems to approach it very closely. A young specimen was obtained by the Blake, and an older one, affording the above description, by the Albatross, in 1884, while off the coast of Cuba.

Marginella hæmatita Kiener.

Marginella hæmatita Kiener, Coq. Viv., p. 11, pl. vii. fig. 31, 1834. Dall, Bull. M. C. Z., IX. p. 137, Dec. 5, 1881.
Erato hematina Reeve, Conch. Icon. *Erato,* pl. xi. fig. 8 a–b, 1865.

Habitat. Stations 10 and 11, in 37 fms.; Station 247, in 170 fms., off Grenada; Station 276, in 94 fms., Barbados.

One of the most lovely little shells of the region.

Marginella fusina Dall.

Plate XIX. Fig. 4.

Marginella fusina Dall, Bull. M. C. Z., IX. p. 72, Aug. 25, 1881.

Habitat. Yucatan Strait, 640 fms.

Marginella yucatecana Dall.

Plate XIX. Fig. 5.

Marginella (var.?) *yucatecana* Dall, Bull. M. C. Z., IX. p. 72, Aug. 25, 1881.

Habitat. Yucatan Strait, 640 fms.; off Sand Key, South Florida, 125 fms.

As no more material has come to hand in regard to this species the question of its relations to *M. seminula* remain unsettled, but it appears, on mature consideration, probably distinct.

Marginella opalina Stearns.

Marginella opalina Stearns, Proc. Boston Soc. Nat. Hist., XV. p. 21, Jan. 17, 1872.

Habitat. West Florida, in 14 fms.; Barbados, in 100 fms.; Tampa, Fla., Stearns.

The researches of Mr. Hemphill in Florida, and of the U. S. Fish Commission in the Gulf of Mexico, have brought together material which seems to bridge the gap between this species and *M. denticulata* Conrad, described many years previously as a fossil. We find that the shell varies from wholly rich amber brown to a lighter brown with obscure light and dark bands, to white or pale yellow with darker yellow or brown cinctures, and finally to pure white. The last form is what is here reported from Barbados, and has since been found on the eastern coast of the United States nearly to Hatteras. The shape of the shell is quite constant, and does not vary with the color. The *M. aureocincta* Stearns is a constantly smaller and more slender species, running through a similar range of color. It has been called *M. Smithii* by Prof. Verrill.

Marginella seminula Dall.

Plate XIX. Fig. 2.

Marginella seminula Dall, Bull. M. C. Z., p. 72, Aug. 25, 1881.

Habitat. Yucatan Strait, 640 fms.

Marginella (*Glabella*) *elata* Watson, from Culebra Island, in 390 fms., belongs to this group, and should be carefully compared with *M. aureocincta*, the young of which it appears closely to resemble, and which has been abundantly dredged in deep water by the Fish Commission.

Marginella Redfieldii Tryon.

Marginella Redfieldii Tryon, Manual of Conch., V. p. 34, pl. x. fig. 99, 1883.

Habitat. Station 5, near Havana, Cuba, in latitude 24° 15′ N. and longitude 82° 13′ W., in 229 fms., soft bottom, temperature about 50° F.

This species in this haul was found rather numerous, with *M. succinea* and *M. torticula*. It seems sufficiently distinguished by its very narrow straight mouth, thin outer lip, and anterior attenuation.

Marginella fusca Sowerby.

Marginella fusca Sowerby, P. Z. S. 1846, p. 95. Redfield, Cat. Marg., p. 234, 1870.

Habitat. North of Cuba, in lat. 24° 43′ N. and lon. 83° 25′ W., in 37 fms. (dead).

Marginella succinea Conrad.

Plate XIX. Fig. 6.

Marginella succinea Conr., Proc. Acad. Nat. Sci. Phil., III. p. 26, pl. i. fig. 17, 1846.
Marginella (*avena* var.?) *avenella* Dall, Bull. M. C. Z., IX. p. 73, Aug. 25, 1881.

Habitat. Off Sombrero Island, in 70 fms. (dwarfs); Sand Key, 125 fms.; Station 5, north of Cuba, in lat. 24° 15′ N. and lon. 82° 13′ W., in 229 fms., abundant; Station 2, off Morro Light, Cuba, in 805 fms.; and off Cape San Antonio, in 1002 fms. Bottom soft ooze, with temperatures between 40° and 50° F. where recorded.

This species, which I was led to think a possible deep-water race of *M. avena*, is found more or less abundantly in shallow water in South and West Florida. Specimens have been compared with Conrad's type, by the kindness of Mr. G. W. Tryon, Jr., at the Academy of Natural Sciences, Philadelphia. Conrad's species has never been figured in a satisfactory manner. The figure we give represents, considerably enlarged, a rather blunt-tipped deep-water specimen. They vary somewhat in the height and acuteness of the spire. The color is usually light fawn or amber of the yellow shade, or a mixture of the two without color pattern. I have from Florida some small pure white specimens which are only differentiated by color and size from the typical form, though the absence of color gives them quite a distinct aspect. This species as a whole is distinguished from *M. Redfieldii* Tryon, by its more flexuous and callous outer lip and wider aperture; from *M. torticula*, by its greater width and straight axis; from the *Volvarina* group, by the higher spire and posteriorly angulated outer lip. The deep-water form is larger and less pellucid than those found in shallow water, but hardly distinct enough to retain a separate name. Mr. Tryon unites this with *nitida* Hinds, described in 1844 without locality. I confess myself unable to see the exact correspondence between them which he mentions, even by his own figures. The color and form seem to me quite as different as in any two valid species of the same group. If *nitida* is to supplant a later name, it would seem that *Marginella paxillus* Reeve is much more like *M. nitida* than is Conrad's species. The species described by Hinds is of a deep brown, like the dark varieties of *M. opalina* Stearns. In looking over a great many specimens which have come to me, I have never seen a specimen of *M. succinea* of this color, though, knowing how variable this section of the genus is in its coloration, there seems to be no reason why it should not occasionally be of a dark color.

Marginella styria n. s.

Shell slender, extremely lucid, glassy or colored by the soft parts showing through; whorls four and a half; spire conical, rounded, and rather blunt; suture visible, whiter than the rest of the shell, being thicker and more opaque; shell subfusiform, the convexity of the left side somewhat greater than that of the right; aperture very narrow; outer lip hardly thickened, produced and impressed toward its middle part; columella four-plaited, without callus; aperture less than two thirds the length of the shell. Length of shell, 5.55; of aperture, 3.50; greatest width of shell, 2.00 mm.

Habitat. Dredged near Sombrero Island, in 54 fms., also at Station 5, in 229 fms., with the preceding.

This little shell has somewhat the shape of *Marginella torticula* in miniature, but is less asymmetrical. I have not found any species described or figured which is so small, slender, and lucid as this one, though there are a number of species which approach it in general outline on a larger scale.

Marginella torticula Dall.

Plate XIX. Fig. 7.

Marginella torticula Dall, Bull. M. C. Z., IX. p. 73, Aug. 25, 1881.

Habitat. Station 5, lat. 24° 15′ N., lon. 82° 13′ W., in 152 fms., soft coral ooze ; also in 229 fms., near Havana, bottom temperature about 50° F. These two hauls seem to have had but one station number.

The number of specimens obtained, and their uniformity of character, sufficiently indicate that the bent axis of this species is not an individual or pathological character. The color is about the same as in *M. succinea* and *M. Redfieldii.*

Section ? VOLVARINA Hinds.

Volvarina avena Valenciennes.

Marginella avena (Val. MS.) Kiener, Coq. Viv., p. 17, pl. vi. fig. 24, 1834.
Marginella avenacea Deshayes, in Lam., X. p. 455, 1844.
Marginella Beyerleana Bernardi, J. de Conchyl., IV. p. 149, pl. v. figs. 15, 16, 1853.
Marginella livida Reeve, Conch. Icon., pl. xx. fig. 100, 1865.
Marginella avena Redfield, Cat. Marg., p. 223, 1870.

Dredged dead off Cuba, in 200 fms., and at Station 2, in 805 fms., probably from shallower water.

Volvarina avena var. guttula Reeve.

Marginella guttula Reeve, Conch. Icon. *Marginella*, pl. xx. fig. 101, 1865.

Dredged living off Sombrero Island, in 72 fms. Mr. Tryon confirms my identification of the above "species," described by Reeve without a habitat, and evidently a variety of *M. avena.*

Volvarina albolineata Orbigny.

Marginella albolineata Orbigny, Moll. Cuba, II. p. 99, pl. xx. figs. 27–29, 1845.
Marginella varia (partly) Sowerby, P. Z. S. 1846, p. 97.

Habitat. Barbados, 100 fms. ; Sigsbee, off Havana, in 80 fms.

Volvarina varia of Sowerby comprised two species, according to Messrs. Redfield and Tryon ; namely, the Californian species known to Carpenter and the West Coast conchologists as *V. varia* (which Tryon, following Redfield, considers to equal *albolineata*), and *V. avena.* The latter has not been found on the western coast, but the specimens of *varia* and West Indian *albolineata* are very similar to one another.

Volvarina subtriplicata ORBIGNY.

Marginella subtriplicata Orbigny, Moll. Cuba, II. p. 99, 1845.
Marginella triplicata Orbigny, Moll. Cuba, pl. xx. figs. 30–32, 1842, not of Gaskoin.
Marginella lactea Reeve, Conch. Icon., pl. xvii. fig. 81, and pl. xxiv. fig. 135; not of Kiener.

Habitat. Station 9, seven miles S. by W. from Sand Key, in 111 fms., bottom temperature 55°.5 F.

The fourth plait is often quite perceptible, and I confess to some doubt of the validity of this species. I have not, however, enough authentically named material to decide on its relations with confidence. It seems to be rare.

Volvarina pallida DONOVAN.

Bulla pallida Donovan (not Linné), Brit. Shells, pl. lxvi. fig. 527, 1800.
Voluta pallida Montagu, Brit. Test., p. 232, 1803.
Volvaria pallida Lamarck, An. s. Vert., VII. p. 363, 1822.
Marginella pallida (Kiener) Redfield, Cat. Marg., p. 247, 1870.

Habitat. West Indies; one dead specimen dredged at Station 247, off Grenada, in 170 fms., soft gray ooze, bottom temperature 53°.5 F.

This species probably lives in shallower water.

Section? VOLUTELLA SWAINSON.

Volutella lacrimula GOULD.

Marginella (*Gibberula*) *lachrimula* Gould, Proc. Bost. Soc. Nat. Hist., VIII. p. 280, Feb., 1862. Otia, p. 238, 1865.

Habitat. Off the coast of Georgia, in 400 fms., Gould. Off the coast of North Carolina in 17 to 124 fms., sand, U. S. Fish Commission. Lon. of shell, 2.8; lat. 2.0 mm.

Volutella (lacrimula var.?) hadria DALL.

Volutella lacrimula Dall, Proc. U. S. Nat. Mus., VI. p. 324, 1883.

Habitat. Mud flats at Cedar Keys, Florida, Hemphill.

Shorter, wider, and with the lip less prominent on top of the spire, than in the typical *lacrimula* Gould. The two anterior plaits are subequal and much larger, and extended outside the aperture beyond the two subequal small posterior plaits in *V. hadria*, while in *V. lacrimula* they diminish evenly backward and the anterior pair is not prolonged over the pillar outside the aperture. They have been compared with Gould's original type. The latter is quite pyriform, the shell being widest near the posterior third. The *V. hadria* is more stumpy though still a little pyriform, and has a remarkably thick outer lip. Lon. 2.0; lat. 1.50 mm.

Volutella (lacrimula var.?) amianta Dall.

Habitat. Off the coast of North Carolina, in 14 to 52 fms., sand, U. S. Fish Commission.

Shell more cylindrical, sides more parallel, longer, narrower, thinner, plaits subequal, all small and confined to the aperture, which is narrower. The greatest diameter is about in the middle. The callus where the outer lip rounds over the spire is not prominent. Lon. 2.75; lat. 1.75 mm.

The above all have four plaits. *V. ovuliformis* Orbigny, from the Antilles, has a much narrower aperture and only three plaits.

V. agger Watson, from Culebra Island, in 390 fms., Challenger Expedition, is somewhat peculiarly produced behind in the young state, and does not agree exactly with any of the preceding forms.

Subgenus PERSICULA Schumacher.

Persicula catenata Montagu.

Marginella catenata Montagu, Brit. Test., p. 236, (Suppl., p. 104,) pl. vi. fig. 2, 1803. Redfield, Cat. Marg., p. 227, 1870.

Marginella alba C. B. Adams (worn), Contr. Conch., p. 56, 1850.

Habitat. Off Grenada, Station 262, in 92 fms.

Two dead and worn hermit-crab specimens were found as above, and referred to this species.

Section? GIBBERULA Swainson.

Gibberula minuta Pfeiffer.

Marginella minuta Pfr., Arch. für Naturg., I. p. 259, 1840.

Marginella Lavalleana Orbigny, Moll. Cuba, II. p. 101, pl. xx. figs. 36-38, 1845. Redfield, Cat. Marg., p. 240, 1871.

Marginella minima Sby., Thes. Conch., I. p. 388, pl. lxxviii. fig. 220, 1846; not of Guilding.

Habitat. Barbados, 100 fms., one fresh specimen.

It is probable that this little shell will be found to inhabit the Mediterranean, the southeast coast of the United States, and the coast of California, as well as the West Indies. The specimens from these three regions seem to be identical, but more material should be compared before making a final decision.

FAMILY VOLUTIDÆ.

This family has submitted to many classifications, and contains several natural groups. Yet, as might be expected when we take into consideration the fossil as well as the recent forms, the lines of demarcation begin to grow less sharp, and characters are interchanged, so that it becomes almost impracticable to distinguish, in the group separated from *V. musica*, which for present purposes we may call *Scaphella*, features which may serve as a basis for sectional arrangement as opposed to those which possess merely specific value. It would not fall in with the purpose of this paper to discuss the classifications which have been proposed for the entire family, but to pass over the condition of those belonging to the fauna of the United States would be equally undesirable.

The American *Volutidæ* begin in the Cretaceous. The direct progenitor of the recent *Scaphella* of the east coast of the United States is found in the Eocene (Vicksburg and Red Bluff deposits), and has been described under the name of *Caricella demissa* by Conrad. It is not a *Caricella*, but a *Voluta*, belonging to the group of *V. junonia*. There is a fine species named *V. Newcombiana* by Whitfield, in the Eocene of Bells Landing, Alabama, about the middle of the Lignitic series. It recalls *V. angulata*, and there is no recent species on our coasts which resembles it. *Voluta demissa* has the tip or nucleus of *Aurinia* (*Eopsephœa* Fischer), but strong rounded plaits. The shell is small and thick. The other so-called Volutes of the Eocene seem more closely to approach *Volutilithes*. In the Miocene there are but two * species of the *Scaphella* section yet known; namely, *V. Trenholmii* T. & H. and *V. mutabilis* Conrad. The former is exactly like *V. demissa* in its general features, but has become large and well developed. It persists into the Pliocene; a variety from the Caloosahatchie Pliocene is intermediate between *Trenholmii* and the recent *junonia*. It has been named *floridana* by Heilprin. Its descendant is the living *junonia* of Floridian waters. The *V. mutabilis* of Conrad was described from the Miocene of Maryland. I have not seen any specimen exactly agreeing with Mr. Conrad's figure. All those specimens labelled *Voluta mutabilis* which have come under my observation are indistinguishable from *S.* (*Aurinia*) *dubia* of Broderip, still found living in Florida. Some of my specimens are from the original locality. If Mr. Conrad's figure properly represents his type, it is certainly a very strongly marked variety of or possibly distinct from the *S. dubia*. This group seems to be an offshoot from the *demissa-junonia* series, and is continued into the Pliocene of South Carolina, where two varieties of *dubia* are figured by Tuomey and Holmes under the name of *mutabilis*, though they are possibly not Conrad's *mutabilis*. In recent seas this line of descent is represented by *S. dubia*, *S. Gouldiana*, and *S. robusta*.

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* *V. obtusa* Emmons is a young *V. mutabilis; V. solitaria* is more of the type of *Volutilithes.*

February 18, 1889.

The true Volutes of the *V. musica* type appear in the Red Bluff Eocene. *Voluta mississippiensis* Conrad, of this age, is identical with *V. costata* Sowerby, from the English Eocene. These species are directly derived from *Volutilithes*. They are small, and would, if recent, be placed in the subgenus *Lyria*. Their Miocene descendants begin to diverge from one another, some taking on the large form of recent Volutes, others remaining small.*

None are yet known from the Pliocene, but *V. musica* and *V. virescens* inhabit the waters of the Gulf of Mexico and the Caribbean region at the present day. *Lyria*, which is not distinguishable generically from the small Miocene forms, exists in the shore fauna of subtropical West America, and *Voluta* or *Scaphella* will doubtless be found when the depths are dredged, though the latter is not known at present north of Chile. The single Alaskan species, *S. Stearnsii*, belongs to the group of *S. ancilla*, with which the late Mr. Sowerby absurdly united it. Its nearest congener in the North American region seems to be the *S. Newcombiana* of the Eocene, before referred to, but they are not very closely related. *V. Lamberti* of the English Crag and some Continental Miocene species are nearer to it than any one from our own strata yet known.

Judged by the recent species the shells of the *junonia* group are readily separable from those of the *dubia* group. When the fossils are consulted, it is evident they are genetically connected. I shall, however, retain the sectional distinction of *Scaphella* proper and *Aurinia* for the two series, respectively.

There can be no doubt that the genus *Lyria* is very closely related to *Voluta* as restricted ; and the one is doubtless an offshoot from the other, both existing, well characterized, in the Ballast Point Miocene of Tampa Bay.

That *Volutomitra* belongs in this family is certain, and I give (Plate XXXIV. Figs. 6 and 7) some unpublished drawings of Stimpson showing the shell and dentition of *V. grönlandica*. The shell figured is apparently young ; those which I have received from Copenhagen are larger, and have a proportionally longer canal and a little more of the Mitra form about them than these figures.

The other forms of *Volutidæ* (excluding *Lyria*) belonging to the Antillean region are all rare shells, and, from their rarity, have been little studied. The U. S. National Museum possessed five fairly good adult specimens of *S. junonia*, beside several much more interesting specimens of the very young. Several specimens of *S. junonia* and *A. dubia* were obtained by Pourtalès in the Floridian region. The U. S. Fish Commission in the same vicinity obtained an adult *A. robusta*, old and young *A. dubia*, and eight or nine *A. Gouldiana* in various stages, including one adult living specimen. The very young of *A. robusta* were dredged by the Blake. In this way, probably for the first time, a sufficient number of these extremely interesting shells for satisfactory study has been brought together.

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* This subject will be more fully discussed in my forthcoming Report on the Tertiary Paleontology of Florida, to be published by the Wagner Free Institute of Science, Philadelphia.

Genus VOLUTA Linné.

Voluta Linné, Syst. Nat., ed. x., 1758.

Voluta Lamarck (circumscr.), Prodr. Nouv. Class. Coq., p. 70, 1799; type, *Voluta musica* Linné.

Plejona (Bolten) Link, Beschr. Rost. Samml., p. 110, 1807; type, *V. hebræa* L.

Voluta Gray, On the *Volutidæ*, P. Z. S. 1855, p. 59; type, *V. musica* Linné.

Voluta H. & A. Adams, Gen. Rec. Moll., I. p. 164, 1863; type, *V. musica* Linné.

Volutolyria Crosse, Journ. de Conchyl., XXV. p. 99, 1877; type, *V. musica* Linné.

The type and sole example cited of the genus *Voluta* when restricted by Lamarck was the *V. musica*, which consequently cannot be separated from the generic name, whatever be the fate of other species. Among the numerous names which have been applied to the various sections of the Lamarckian Volutes, the name *Scaphella* of Swainson appears to be the earliest which will be appropriate for those which differ (as M. Crosse and Dr. Gray have shown) from the type by the absence of an operculum and other characters, including their dentition.

The Volutes of the Gulf of Mexico and the Antillean region are comparatively few in number, but among them is found the type of the genus in several very elegant varieties. Among other peculiarities of *V. musica* the form of the nuclear whorls is very noticeable. They comprise a stout rather blunt coil of four or five compact regular well-shaped whorls, somewhat like the tip of a *Megaspira*, generally of a brilliant orange-yellow or its complement, a livid purple, with its initial whorl perfectly regular, its tip in perfect unworn specimens about 0.3 mm. in diameter. In a large series, varying greatly in other respects, I have found only trifling modifications of the nuclear whorls, which present a marked difference from the blunt irregular mammillate tip of most of the species generally included under the old signification of *Voluta*. The young shell with two or three whorls and its nucleus I have found more uniform in its characteristics, when not modified by wear or acid, than the adult shells in this family. Unfortunately I have never been able to examine a very young specimen of this species, which would doubtless give us the normal number of plaits (five ?), which cannot be determined from the adults.

Among the specimens in the U. S. National Museum are three which were referred by Dr. Carpenter with a query to a variety of *Voluta musica*, but which on careful study present characters which seem incompatible with that hypothesis. All are beach shells. Two were collected by Berlandier in 1847, on the coast of Texas, near a place called Mesquital. The other was obtained by Arthur Schott, at Carthagena, New Grenada, during Lieut. Michler's expedition to Darien. It measures about 32.0 by 53.0 mm., and the length of the aperture is 45.0 mm. The shell is lighter than a *Voluta musica* of the same size ; the columellar lip is straighter, with smaller and more numerous plaits ; the outer lip is marked with six purple brown spots, the throat is of a yellowish cream-color. The exterior of the whole shell is marked with sharp distant grooves ; toward the canal the interspaces rise as rather strong threads. The color and painting of the shell are unlike any of the described varieties of *V. musica*. The ground is pretty uniformly clouded with a livid purple brown, with three or four paler bands, which in the young are narrow, distinct, and articulated with rectangular brown spots rather distant from one another; the surface generally is dotted over with a profusion of brown dots, and there is a tendency toward a band of the dark body color just in front of the ribs, which gives the appearance of a succession of large squarish spots, one in front of each rib. There are eleven ribs on the last and twelve on the preceding whorl; they are shorter, more pinched up, and much less prominent than in the short-spired varieties of *V. musica*, which generally have seven or eight very prominent ribs, almost like spines. They are in the present species smaller behind and more inconspicuous than in any *V. musica* I have seen, coronating the suture, and occupying less than half the exposed part of the whorls on the spire. In the adult they are very short, but in the young they are extended nearly to the canal.

The most important feature, however, and that which leads me to believe that the Texas shell is specifically distinct from *V. musica*, lies in the nucleus. This is composed of two turns, of which the first is white and inflated, as in most Volutes of the *Scaphella* group, and is itself larger than the first two turns of the nucleus of *V. musica* taken together. The second turn is, if anything, slightly smaller, giving a papillary appearance to the nucleus. The adult shell has four and a half whorls, which with the nucleus form six and a half, against seven and a half of the *V. musica* of similar length. The youngest specimen of the Texas shell shows seven plaits on the columella, the largest fifteen, of which each alternate one is smaller. I have not been able to find more than twelve plaits on the largest *V. musica* in the collection. This interesting form, the only true *Voluta* known from the coast of the United States, should bear the name of *Voluta virescens* Solander, though Lamarck's later name of *V. polyzonalis* is more appropriate. According to various authorities, *V. virescens* would also have as synonyms *V. fulva* and *chlorosina* of Lamarck and *V. pusio* of Swainson; the latter a broad variety. The West African habitat assigned to *Voluta virescens* is probably erroneous, but at all events there can be no question as to its American habitat.

Genus **SCAPHELLA** Swainson (em.)

>*Scaphella* Swainson, Zoöl. Ill., 2d ser., II., No. 19, 1832; Malacology, pp. 103, 318, 1840.

Caricella sp. Conrad, Journ. Acad. Nat. Sci. Phila., 2d ser., I. p. 120.

It seems evident that *Voluta* and *Lyria* on the one hand and the rest of the Volutes on the other are separated by a greater gap than divides either group above indicated within itself. Some name must be adopted from among those which have been applied to the shells not included in *Voluta* proper to cover the genus, of which most names in use are indicative of merely sectional divisions. *Cymbium* being eliminated, the next name is *Fulgoraria*, which has a too evidently limited application to be adopted for the whole group left anonymous by the abstraction of *Voluta.* The classification of Swainson comes next in order, and by treating his nomenclature according to the accepted rules we find ourselves with three names to select from, *Cymbiola*, *Harpula*, and *Scaphella.* It would seem at the first glance as if this might be decided by the types, but on thorough examination it appears that Swainson was not strict in his use of the expression "type," and named a number of different species as "types" of a single genus in different parts of the same work. His reasoning is so entangled with his peculiar theory of representative groups, as to make his meaning frequently obscure. However, of the names above referred to, *Harpula* may be eliminated, as he figures *V. vexillum* as the example of the genus, and moreover this section is, as it were, somewhat intermediate in its characters, and some day may prove to belong in the vicinity of *Voluta* proper. Of the two remaining names, *Cymbiola* is more restricted in the forms referred to it. In one place *V. ancilla* is cited with a query as to whether this is the type or not (p. 317) ; at another place the author queries whether *V. ancilla* should not form a separate division (p. 106), and on the same page refers to *V. vespertilio* as the type of the whole genus. Yet we find *V. ancilla* referred to as the type of *Cymbiola* by authors of distinction.

The "best known type" also figured (p. 107) by Swainson for his genus *Scaphella* is the *S. undulata.* This group includes a larger variety of forms than the other, and recommends itself to us as on the whole the better for our purpose, and will be here adopted.

Scaphella junonia Hwass.

Plate XXXIV. Figs. 5, 5c, 5d, 5e.

Voluta junonia Hwass, Chemnitz, Conchyl. Cab., XI. p. 16, pl. clxxvii. figs. 1703, 1704; 1795. Swainson, Exotic Conchology, pl. xxxiii.
Scaphella junonia Swainson, Malacology, p. 108, 1840.

Habitat. Pass-à-Grille, Florida, on the beach, Hemphill; Florida Keys, Jewett; Florida Reefs, Pourtalès; Station 2608, U. S. Fish Commission, 17 miles S. E. by E. ½ E. from Cape Lookout, North Carolina, in 22 fms., sand and shell, bottom temperature 78°.2 F. ; Station 2414, in the Gulf of Mexico, between Tampa Bay and Dry Tortugas, lat. 25° 4′ N., lon. 82° 59′ W., in 26 fms., sand ; and near Nassau, New Providence, dead in shallow water.

The adult shell is well known and has been repeatedly figured. It has no overglaze. The characters of the nucleus and the young have been less precisely stated, except as might be inferred from a study of the adult. Chemnitz pointed out that the early whorls are sculptured, and that a coarse spiral striation is faintly visible toward the anterior end. The anterior plaits are less strong than those behind them, especially in the young, a feature which was the chief character relied upon by Swainson in his division of the Volutidæ. A young shell of (in all) three and a quarter turns, perfectly fresh, affords the following notes.

Color. — The beginning of the nucleus livid purple; the second whorl (which is post-embryonic) pale waxen white; the rest of the shell waxen white with five series of rectangular dark purple-brown spots; two other series begin on the last half-whorl; the spots, at first angular, become rounded at the corners; throat, plaits, and siphonal fasciole of varying pale shades of salmon-color; epidermis very thin, smooth, very pale brown.

Sculpture. — Embryonic part of the shell finely granulous and with a slightly irregular surface, its initial point rounded and folded in laterally; next half-turn polished, finely spirally striate; then small narrow longitudinal ribs begin to appear, which are most developed on the third whorl and begin to die out at the end of that whorl. These when most developed extend entirely across the whorl, their centres a little more than a millimeter apart, on the average. There are in this specimen about twenty-four well-developed ribs, and a number more or less incomplete or obsolete. They are, on the body of the whorl, crossed by fine threads, more prominent in the interspaces between the ribs, and on the anterior part by about ten stouter threads, which ride over the ribs and reticulate them; these threads, however, become obsolete on the siphonal fasciole. The pillar has four strong plaits on its posterior half; they increase in size, from in front backward. The length of the shell is 23.0; the length of the last whorl, 19.0; the maximum diameter of the shell, 12.0 mm. The form of the nuclear (embryonic) part is globose, with the initial point rounded and slightly inflated, or protruding laterally from the general orb of the nucleus.

From the appearance of the nucleus in these forms of the genus I am impressed with the idea that the earliest shell substance, under which a shelly nucleus is secreted, is soft and cuticular, and that this protoconch is lost, perhaps while still in the ovicapsule. In this respect they differ strongly from the true Volutes typified by *V. musica*, which look as if their regularly coiled nucleus was shelly from the outset. Another point is worthy of attention, and that is that the young shells appear to show the plaits much more characteristically and normally than do the adults, especially in the section which follows (*Aurinia*). It should also be noted that the characters of the nucleus cannot be as well studied in the adult shell as in the very young, for the shelly matter of and about the nucleus seems softer than that secreted by the adult, and all the characteristic features are liable to be worn away, leaving a smooth mammillary tip which might readily be taken as normal. It would seem that the Volutes, as they grow, rapidly fill the cavity of the nucleus with solid shell, from which the original surface is in adults often entirely worn away, without appearing denuded to the observer.

It is perhaps worth mentioning that a very intelligent waterman with whom I cruised on the west coast of Florida, and who had found a living *Scaphella junonia* on the beach after a heavy storm, insisted that it had an operculum. He cleaned the shell and sold it to a tourist, but did not preserve the operculum, which he alleged resembled that of *Fulgur*, but was proportionally smaller. I give this information for what it may be worth, and am by no means certain that the memory of my informant is to be wholly trusted; though I believe the statement was made in entire good faith.

Subgenus AURINIA H. & A. ADAMS.

= *Aurinia* H. & A. Adams, Gen. Rec. Moll., I. p. 166, 1853.
< *Aurinia* H. & A. Adams, *Ibid.*, II. p. 617, 1858.
< *Livonia* Gray, *fide* H. & A. Adams, *l. c.*, p. 617, 1858.
= *Volutifusus* Conrad, Proc. Acad. Nat. Sci. Phil., p. 563, 1862; Meek, Check-List Inv. Fos. N. Am. Miocene, p. 19, 1864. Conrad, Am. Journ. Conch., II. p. 66, 1866. Tryon, Struct. & Syst. Conch., II. p. 166, 1883.
< *Megaptygma* Gabb, Proc. Acad. Nat. Sci. Phil., 1876, p. 292; Tryon, Struct. and Syst. Conch., II. p. 166, 1883 (not *Megoptygma* Conrad, Proc. Acad. Nat. Sci. Phil., 1862, p. 563, type *V. sinuosa* Gabb).
Aulica sp. Tryon, Man., IV. p. 90, 1882.

Shell fusiform, thin, columellar plaits obsolete in the adult, external surface finely sculptured sometimes beneath an overglaze; permanent nucleus beginning with a sharp erect point; operculum and radula absent. Type, *Voluta dubia* Broderip.

The subgenus *Aurinia* was first proposed by H. & A. Adams for *V. dubia*. In the supplement to their work they included with it an entirely distinct form with a lateral nucleus, which would seem to have been named *Livonia* by Gray, and afterward *Mamillana* by Crosse. *Volutifusus* Conrad was based on *V. mutabilis*, *V. dubia*, and allied forms purely identical with *Aurinia*. *Megaptygma* Conrad, which has been united with *Volutifusus* by Gabb and Tryon, has directly antithetical characters, as the name implies, and, while perhaps not valid, is not a synonym of *Aurinia* or *Volutifusus*. All these forms have been referred to *Aulica* by Tryon, but the nucleus of *Aulica* is of an entirely different character.

The type is one of the most remarkable shells of the family. It is accompanied in the Miocene Tertiary by *Aurinia mutabilis* Conrad, and is itself not uncommon in the Post Pliocene.

It may be observed, that the *Scaphella* (*Psephœa*) *concinna* Broderip,* of which a fairly preserved specimen was dredged by Stimpson in Hakodadi Bay, Japan, is closely related to *Aurinia* in its conchological characters. The extreme tip of the nucleus appears to be lost in all the specimens, but is very likely to resemble that of *Aurinia*. The Eocene species of the Paris Basin referred to by Dr. Fischer (Man., p. 607, ex. *V. muricina*), and to which, on account of their Aurinia-like nucleus, he has given the name of *Eopsephœa*, may be paralleled in the *Scaphella demissa* of our own Eocene, which has, however, the plaits of normal *Scaphella*. It is evident that the gaps are bridged by the fossils, and too many names will prove little less than a burden.

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* Of which *S. lyriformis* Kiener (not Swainson) and *S. Prevostiana* Crosse are perhaps varieties, and all possibly referable to *S. megaspira* Sby.

It may also be noted that the peculiar thick anterior plait in *S. Prevostiana* and *concinna* is almost paralleled in the *S. Stearnsii* of Alaska, though, if the description given in the Manual by Dr. Fischer of the dentition of *S. concinna* be correct, the two species are very properly subgenerically, or even generically separated. Still, the free interchange of characters in the known species would lead us to suspect a similar state of things with those species whose soft parts are not yet known, and it will not be until all have been examined that we can feel confident that any present arrangement will not have to be modified.

Aurinia dubia Broderip.

Voluta dubia Brod., Zoöl. Journ., III. p. 81, pl. iii. fig. 1, 1828.

Fusus tessellatus Schubert & Wagner, Suppl. Bd. Mart. und Chemn. Conchyl. Cab., p. 24, pl. ccxix. figs. 3048, 3049, 1829. Kiener, Icon. Rec. Shells, *Fusus*, p. 39, pl. xxix. fig. 1, copied in Reeve, Conch. Icon., IV. *Fusus*, pl. xiv. fig. 53, 1847. (Not of Zekeli and Pictet, Fos. Gosaugeb., 1852.)

Voluta dubia Sby., Thes. Conchyl., pl. lv. fig. 115, 1847; Reeve, Conch. Icon. *Voluta*, pl. xxii. fig. 59, 1849.

Voluta (Aurinia) dubia H. & A. Ad., Gen. Rec. Moll., I. p. 166, 1853.

Voluta (Volutifusus) dubia Conrad, Am. Journ. Conch., II. p. 66, 1866.

Voluta mutabilis Tuomey & Holmes, Plioc. Foss. S. Car., p. 128, pl. xxvii. figs. 5, 6, 1856. *Not of Conrad*, Journ. Acad. Nat. Sci. Phil., VII. p. 135, 1838, and Am. Journ. Sci., XLI. p. 346, pl. xi. fig. 7, 1841.

Voluta (Aulica) dubia Tryon, Man., IV. p. 90, pl. xxvii. figs. 77, 81, 1882.

Voluta dubia Dohrn, Jahrb. D. Mal. Ges., VI. pp. 150–156, pl. iv. figs. 1–3, 1879.

Habitat. Florida Reefs, Pourtalès, south and west coast of Florida, Dohrn; U. S. Fish Commission, at Station 2402, between the mouth of the Mississippi and Cedar Keys, in the Gulf of Mexico, lat. 28° 36′ N., lon. 85° 33′ W., in 111 fms., gray mud, two living specimens; Station 2603, thirty-six miles S. ½ W. from Cape Hatteras, N. C., in 124 fms., sand; Station 2604, thirty-nine miles S. by W. ½ W. from Cape Hatteras, in 34 fms., yellow sand, bottom temperature 79° F. (dead fragment); and Station 2614, thirty-six miles S. E. ½ S. from Cape Lookout, N. C., in 168 fms., gray sand, bottom temperature 48°.5 F. (fresh young specimen).

This is probably the most slender species of the genus, and one of the thinnest, though the specimens figured by Dohrn seem to have been heavier than any of those I have seen, or than are represented by any of the other figures extant. It is covered all over by fine spiral sculpture, no coarser in front than elsewhere; it has also the peculiarity noted in some species of *Cymba*, of sometimes being covered all over by a sort of whitish glaze, which obscures the suture, the sculpture, and the coloration. Dohrn's figures look as if the shells had been artificially cleaned, to the advantage of their appearance but the loss of scientific value. This species has normally only two plaits, which, in the adult, are generally obsolete; one of Dohrn's, however, had the columellar edge grooved, as if possessing two additional minor plaits.

A young specimen, of the same age as the young *S. junonia* before described, presented the following characters.

Colors. — Nucleus and first turn purplish brown (this fades with wear and exposure to an orange or buff); ground color pale salmon, or like the inside of a ripe canteloupe melon; spots smaller, more angular, and more uniform than in *S. junonia*, and arranged in six series; the peripheral series had twelve spots, in *S. junonia* only nine; pillar like the basal color.

Sculpture. — The nucleus, larger than the next turn, is finely granulous as in *junonia*, but is shaped like *Natica mamilla;* the initial point *is* a point, distinctly elevated above the rest. When its original surface is worn away, the hard core with which it is filled forms a sharper and more elevated point than there was originally. The spiral striation is uniform; the whorls are compressed in front of the suture; the ribs therefore, which do not become obsolete as soon as in *S. junonia*, have their shoulders some distance in front of, instead of at, the suture, as in that species; there are seventeen of them on the last turn, and they become obsolete immediately in front of the periphery as a rule; the epidermis, smooth in the adult, is distinctly hispid in the young; there are two clear cut but small plaits on the remarkably straight columella at its posterior end. The shell is 32.0 mm. long, the last whorl, 27.0 mm., and the maximum diameter, 12.0 mm. In an adult of 90.0 mm. long, the maximum diameter is 25.0 mm.

A very good figure of this species is that (fig. 5) given by Tuomey and Holmes, above cited. It represents a specimen from the Post Pliocene beds of the Peedee River, S. C. Casts are said to be abundant in the marl of Goose Creek. Neither of the figures on this plate represents the typical *S. mutabilis,* as they differ remarkably from Conrad's original figure.

Two specimens of this species were obtained in a living state at Station 2402, by the U. S. Fish Commission, but were not discovered in the alcoholic collection until after the preceding and succeeding remarks on this family had been some time concluded. They were both males, and afforded the following notes.

The animal is of a pinkish white color, the anterior parts more orange or reddish, the sides granular, with stellate black markings, and a certain amount of dark pigment aggregated toward the tip of the proboscis, siphonal fold, and margin of the foot. The foot is somewhat auriculated at its anterior corners, double across its front edge, and folded longitudinally. The tentacles are large with acute tips, and their bases, laterally angulated, continuous with the veil and not notched, are separated in the median line by a deep sulcus. The eyes are small and black, on small pretty well differentiated peduncles, outside of and behind the bases of the tentacles. There are two well-developed gills, and, on the opposite side, on the dome of the mantle, a large transversely corrugated slime-gland. The anus is in the nuchal commissure and inconspicuous. The penis is not sickle-shaped, but small, subrectangular, with an inconspicuous lateral tip, the whole laid back on the neck and pointing caudally. There is a small squarish appendicle to the siphonal fold which resembles that of *A. Gouldiana*. There is no jaw, nor any radula, so this feature may be taken as diagnostic of *Aurinia*. There are two little cartilaginous pads near the tip of the proboscis. There is no opercular pad or operculum, nor was there any visible color gland.

On the whole, the general characters of the soft parts agree well with *A. Gouldiana*, though differing in some minor details.

Aurinia robusta n. s.

Plate XXXV. Fig. 2.

Shell large, stout, with a chalky external layer under a thin pale yellow epidermis, and an internal porcellanous white layer; a strongly curved and recurved canal; four columella plaits, nearly obsolete in the adult; the surface finely spirally striated; earlier whorls with the suture appressed and numerous (on the fourth whorl about 25) small short transverse riblets mounted on the periphery; outer lip sharp; throat pure white; pillar lip merely glazed, exterior spotted with squarish brown spots with less regularity of size and position and more distant than in *S. junonia;* whorls six beside the nucleus, fully rounded, somewhat irregularly coiled. Lon. of shell, 119.0; of last whorl, 100.0; of aperture, 88.0 mm. Max. diameter of shell, 52.0 mm.

Nucleus small, of one and a half concave whorls, with the acute initial point central, rising above the margin of the concave, which is formed by the sharp posterior edge of the first post-embryonic whorl; this whorl is sculptured with very low flat striated transverse riblets with narrower channelled interspaces, extending clear across the whorl and both crossed by about eight distinct spiral threads between the two sutures; after the first turn the transverse bands become narrower, the interspaces about equal to them, and the spiral threads wider and flattened so that a fine and exceedingly elegant trellising is the result. The second whorl begins to be spotted with squarish brown spots with fainter edges, of which seven series appear at the end of the second turn; interior yellowish white with four sharp plaits on the pillar, very oblique, and growing stronger backward; epidermis smooth, thin, not polished; suture very closely appressed. Lon. of this young shell, with nucleus and two whorls, 12.0; of second whorl, 11.0; max. diam., 5.0 mm.

Habitat. Station 55, off Havana, in lat. 22° 9′.5 and lon. 82° 21′.5, in 242 fms.; Station 50, lat. 26° 31′ and lon. 85° 53′, in 119 fms; U. S. Fish Commission Station 2397, in the Gulf of Mexico, lat. 28° 42′, lon. 86° 36′, in 280 fms., gray mud, bottom temperature 46°.1 F.

This fine and remarkable species is peculiarly distinguished by its chalky outer layer, under a pale epidermis, which becomes eroded, like that of a freshwater shell. The form of the nucleus, if the hypothesis of a membranous embryonic first shell be admitted, would be due to a calcification which did not extend to the dome of the membrane, while the acute initial point of the calcified part may be supposed to occupy the vicinity of the pillar in the soft shell. The posterior margin of the first post-embryonic whorl might easily be rounded off by erosion, when the solid nucleus within after a little wear would put on quite a different appearance. The pattern of coloration, resembling *S. junonia* and *S. dubia*, also resembles that of young *Conus floridanus*, *Conus Mazei* Deshayes, and other not related archibenthal species. The pillar is more flexuous than in either of the other species. The riblet sculpture resembles not only that of *S. dubia* and *S. Gouldiana* in a general way, but also that of the fossil *S. mutabilis*, perhaps the precursor of all the Gulf species. The Blake dredged only fragments of this shell, the Fish Commission a single adult.

Aurinia Gouldiana n. s.

Plate XXIX. Fig. 3.

Voluta Gouldiana Dall, Conch. Exchange, II. p. 10, July, 1887.

Shell rather small, solid, slender, white, brownish plum-color, or spirally banded with whitish and claret-color, rarely square-spotted in spiral series; whorls moderately full, five and a half beside the nucleus; sculpture of fine close distinct spiral threads covering the whole surface except the anterior part of the last whorl, where they gradually give way to much stronger and more distant threads, which in some specimens wind into the aperture, as if simulating small plaits; the nucleus is nearly flat, whitish, consisting of one whorl rising a little above the posterior edge of the first post-embryonic whorl, and having a central projecting initial point, but less prominent than in *V. robusta*. The suture is appressed and in the early whorls a little marginated; the first whorl is only strongly spirally striated and convexly rounded; the succeeding whorls have the periphery rippled by a succession of (on the third whorl 22) small waves, with their anterior slope steeper than the other, and which, in some specimens, extend to the last third of the last whorl before becoming obsolete, though ceasing sooner in others; these waves are generally confined to the periphery and vary in strength and number in different specimens, one specimen having only eighteen on the third whorl; the color varies from yellowish white to a ruddy brown with a suggestion of purple in it, which is usually stronger at the suture along the pillar and outer lip, and especially toward the end of the canal. The fresh specimens nearly all show a tendency to spiral banding; one beautiful but half-grown specimen has six narrow pale bands, the second from the suture being on the periphery, with the much wider interspaces of a brownish claret color; this fades slightly, but the white ones do not seem faded. The outer lip is sharp with a dark margin, the throat whitish, the pillar callus yellowish white; there are, in the very young, four plaits, of which the first and third, counting backward, are fainter than the other two; in adult shells rarely are more than two visible and those are quite faint; there is only a light glaze on the body whorl; in the adults the nucleus and first whorl are generally so worn as to resemble one of the common round mammillate tips seen normally in many Volutes. Lon. of shell (largest adult), 69.0; of last whorl, 55.0; of aperture, 45.0; max. diameter of shell, 25.0 mm.

Habitat. U. S. Fish Commission Station 2316, off Key West, in 50 fms., coral, a unique spotted fragment; Station 2415, off Georgia, in 440 fms., sand; Station 2314, off South Carolina, lat. 32° 43′, lon. 77° 51′, in 159 fms., coarse sand, bottom temperature 47°.4 F.; Stations 2624 and 2625, seventy-five miles S. by E. ½ E. from Cape Fear, North Carolina, in 258 and 247 fms., gray sand, bottom temperature 46°.0 F.; also at Stations 2659 and 2661, off Cape Canaveral, Florida, in 509 and 455 fms., bottom temperature 45°.2 and 45°.5; Station 2665, off St. Augustine, in 263 fms., sand, temperature 45°.2; and Station 2668, off Fernandina, in 270 fms., sand, temperature 48°.3 F. (living).

This species is the only one of the group, except *V. vexillum*, which has a normal color pattern of unmodified spiral bands. Out of twelve specimens seen, only one had the bands broken into squarish distant spots. Its surface, in some specimens, shows a very thin chalky layer, but it does not seem to be subject to erosion. Though a comparatively small species, it offers in its coloration an agreeable variety from the brown spotted pattern presented by the others, and, with the exception of *V. Stearnsii* which outrivals all others, is one of the most northern species of the genus. It is named in honor of the late Dr. A. A. Gould, author of the Report on the Shells of the Wilkes Exploring Expedition.

This species is entirely without trace of an operculum, opercular gland, or pad. To better make comparisons I took the oportunity of examining the corresponding soft parts of *Scaphella Stearnsii* Dall, from Alaska, in lat. 55° N., lon. 160° W. Gr.

In *S. Stearnsii* there was a small but distinct opercular pad, but with no operculum on it. I should not be surprised if at some future time specimens of this species were found with a small operculum. The surface of the foot in *S. Stearnsii* is coarsely granulous, whitish with spots and streaks of vermilion. The color gland produced an abundance of a beautifully pure blue secretion. In *Aurinia Gouldiana* the surface of the foot is velvety, smooth with very fine granulations, white, with shades of olive tipping the stronger granulations. The sole of the foot in *Stearnsii* (as contracted in alcohol) showed a spongy layer with reticulated structure, evidently very distensible, the front edge of the foot was double, the groove not deep, and the front edge seemed to show no tendency to indentation in the median line, or lobulation at the anterior corners; *Gouldiana* seemed to be somewhat indented, otherwise the foot did not differ from *Stearnsii* except that the spongy sole was of finer texture. In both, in retracting it into the shell, the foot was folded longitudinally. In *Gouldiana* the secretion of the color gland is pale violet and scanty. There are two gills in both species, the lower or outer (left hand) one the smaller. In *Gouldiana* the outer gill is a blackish olive-color, the other one whitish like the body. The former doubtless performs the function of an osphradium, but I question whether it has not also something of a respiratory function. In *Stearnsii* the gills seemed coarser and the lamellæ proportionally less numerous. The penis in *Gouldiana* is stout, long, and twisted back, circularly wrinkled with a small pointed appendage at the tip. In *Stearnsii* the penis is broader and shorter, folded under and backward, and shaped like the distal end of a flattish bean-pod, transversely striated and thicker on its anterior than on its hinder edge. In *Stearnsii* there are two appendages like tentacula at the posterior end of the siphonal fold, one on each side, which must project forward when the animal is expanded; in *Gouldiana* there is a median ridge in the gutter of the siphonal fold, which projects more and more as one follows it backward, and at its posterior end has a single appendage, shorter and broader than the lateral appendages of *Stearnsii*, which last has no median ridge in the fold. There is something like this ridge in the siphonal fold of *Turbinella pyrum*.

In *Stearnsii* the siphonal fold when developed by the animal must resemble that of *Cymbiola brasiliana* as figured by H. and A. Adams (Gen. Rec. Moll., pl. xviii. fig. 1), and the rest of that figure would do very well for the soft parts of *Scaphella Stearnsii* except in two particulars. The first is, that the flap, upon the anterior outer corner of which the eyes are situated, ceases a little distance behind the eye, and its outer edge rounds inward to the body wall. The second is, that between the tentacula and separated from them by a deep notch on each side is a broad flap or veil, very thin and rounded in front without indentation. From under this the stout long proboscis is extruded. This flap in a contracted state is as long as the tentacles. The teeth are precisely like those of *Scaphella scapha* L., as figured by various authorities (Troschel, Gebiss der Schnecken, Bd. II. pl. v. fig. 3).

In *Aurinia Gouldiana* the front of the head is somewhat different. The eye flaps are small and subtriangular, instead of rounded rectangular. The tentacles are proportionally flatter, larger, and longer, and are divided from the veil by only a slight notch. The veil itself is divided into two lobes by a deep median fissure, and these lobes have each a sort of blunt point in the middle in front. I was unable to discover any radula after careful search. There certainly was no sign of it in its proper place.

It will be seen from these observations, that, so far as the head and foot are concerned, *Aurinia* is very much like *Lyria*. The siphonal fold, penis, and operculum differ; the last being wholly absent in *Aurinia*. From *Scaphella* proper it is also separated by marked differences of the soft parts. I hope that in time I shall be able to examine the soft parts of *V. junonia*. The late Colonel Jewett told a story, which might well make a conchologist shudder, of coming upon a Floridian "Cracker," by the beach, just as he had broken the roasted shell of a fine *V. junonia*, and was about to swallow the contents!

Genus MITRA Lamarck.

The Mitre-shells of the West Indies have never been revised, though a list of the species known or supposed to belong to the fauna was included by Krebs in his Catalogue, and the species referred to in the general literature were indexed by me in the "List of Marine Mollusca." Some species have been wrongly referred to this fauna, such as *exilis* Reeve, and *tiarella* Lamarck, through erroneous identifications or labels. Some species have been so poorly described that no identification is possible, such as *obliquata* Lam. (perhaps a variety of *nodulosa*) and *exigua* C. B. Adams. *M. interpunctata* Carpenter, I find catalogued by Mörch in Poulsen's list; but I can find no other reference to it, or any description anywhere, so I suppose it to be unpublished.

There can be no question that the group, generally called by the untenable name of *Turricula*, Klein, is entitled to be generically separated from the true Mitras; but being unable to procure the soft parts of the species which I have for study, I prefer for the present to retain them under the general name of *Mitra*, even when the contour is that of species known to be Turriculate, since the form of the shell in this matter is far from decisive.

There are but two common species of *Mitra* in the West Indies; namely, *M. nodulosa* Gmelin (*nucleola* Krebs, *obliquata* Pfr., *granulosa* Brugière, Lamarck, and the majority of authors) and *M. barbadensis* Gmel. (*striatula* Lamarck, *tessellata* Kiener, *picta* Reeve, and perhaps *cœligena* (Rve.?) Krebs). Neither of these was obtained by the Blake, and both are usually seen in a more or less worn or rolled condition. There is a close connection between *Mitra lens* of the western coast of America and *M. nodulosa;* the characteristic pits may frequently be seen in undoubted *nodulosa*. There is a variety, referred to *M. lens*, by the name of *Dupontii* Kiener, which is said to come from the Red Sea, a locality which Tryon and others have doubted. It may be erroneous, but there is nothing *a priori* unlikely in it; as I have a specimen half-way from *nodulosa* to *lens* which every one would say was an immature *lens* if it came from Panama; and it is well known how Red Sea species are constantly turning up about the West Indies, especially those from rather deep water.

Other ancient species which are certainly West Indian are *M. sulcata* Gmelin (*microzonias* Lam., *monilifera* C. B. Adams), and its variety *cavea* Reeve; *M. dermestina* Lamarck (of which *speciosa*, *pulchella*, and *histrio*, Reeve, are mere variations) and *ebenus* Lamarck, which I have also under the names of *M. chelonia* Reeve and *M. nitilina* Duclos. *M. semicostata* Anton, I have not seen, but from the figure it might be a ribbed variety of *ebenus*. Of more lately described species we have *M. albocincta* C. B. Adams, a good species (miscalled *M. albicostata* Ad. in my list of "Hemphill's Shells"), which on a very dwarfish scale recalls *M. sulcata*, and is a native of the Florida Keys and Cuban waters; *M. puella* Reeve, Florida and the Antilles (*alveolus* Reeve is perhaps synonymous); *M. candida* Reeve (of which *straminea* A. Adams, may be an elongated variety); *M. Hanleyi* Dohrn (1862), not of Sowerby (1874) nor *Hanleyana* Dunker (1877); this is a pale and delicately marbled species, varying from nearly pure white to mottled gray with dark columella, and which has a nearly black variety with white ribs that has received the name of *M. gemmata* from Sowerby. The difficulty attending the generic determination of these small shells in the absence of the soft parts is illustrated by the fact that Tryon puts one of these varieties in *Mitra* proper and the other in *Turricula*. It abounds in the Florida Keys. *Mitra floridana* Dall, a little black (sometimes pale brown) species, is found with it.

The Blake collection furnishes several interesting forms, and a new one has recently been obtained from the same region by the U. S. Fish Commission.

Mitra Swainsoni BRODERIP.

Plate XXXVIII. Fig. 7.

Mitra Swainsoni Broderip, P. Z. S. 1835, p. 193. Reeve, Conch. Icon. *Mitra*, pl. i. fig. 4, 1844. (Not Sby.?) Agassiz, Three Cruises of the Blake, II. p. 70, fig. 293, 1888.

Habitat. "Monti Christi, West Columbia," in 7 fms., sandy mud, Cuming. Variety *antillensis* Dall, Blake Station 250, in 421 fms., off Grenada, broken shell. U. S. Fish Commission Station 2354, off Arrowsmith Bank, Yucatan, in 130 fms., coral bottom; Station 2614, thirty-six miles S. E. ½ S. from Cape Lookout, N. C., in 168 fms., gray sand.

The shells dredged by the Fish Commission which retain their epidermis and are nearly perfect agree very well with Reeve's figure; the later figure of Sowerby seems to be taken from a different species, perhaps a variety of *M. maura* as suggested by Tryon. The shouldered whorls and black epidermis are quite different from the regular convex series of whorls and olive-gray epidermis of the specimens before me. I have been able to compare my shells with a specimen of *M. Swainsoni* in the British Museum, and find them very similar. The color in the Antillean shells is a little more gray, and the shell not quite so rude in its general aspect. The range thus indicated is extraordinary, but not more so than that of *Amusium Mortoni* or *Conus Delessertii* Recluz. There is an almost identical species in the Miocene of Maryland, of which I have only seen fragments.

Mitra fulgurita REEVE.

Mitra fulgurita Reeve, Conch. Icon. *Mitra*, pl. ix. fig. 61, 1844.

Habitat. Sigsbee, off Havana, in 119 fms.; near Barbados, at Stations 282, 290, and 299, 73–154 fms., bottom temperature 56°.5 to 73°.5 F., coral bottom; also at Station 220, near Santa Lucia, in 116 fms., rocky bottom, bottom temperature 58°.5; Station 247, off Grenada, in 170 fms., ooze, bottom temperature 53°.5 F. Also by the U. S. Fish Commission at Station 2646, off Cape Florida, in 85 fms., gray sand.

The habitat of this species according to Tryon has been hitherto unknown. The specimens were mostly rather young. The longitudinal white flammules are exceptional, the tendency, at least in the young, seems to be toward a pale zone at the periphery, with darker brown on each side of it, especially in front of the sutures. The epidermis is well marked; the interior of the aperture is white, with one obscure and three well-marked plaits, in the Blake specimens.

Mitra straminea A. Adams.

Mitra straminea A. Adams, P. Z. S. 1851, p. 132; Sby., Thes. Conch. *Mitra*, pl. xxv. fig. 561, 1874.
? *M. pia* (Dohrn MS.) Sby., *l. c.*, fig. 550 (an adult ?).
? *M. Malleti* Petit, Journ. de Conchyl., III. p. 58, pl. ii. figs. 1 a–b, 1852.

A single specimen of what appears to be this species was dredged off Cuba, at Station 36, in 84 fms. It looks as if it might be a young stage of *M. pia*, but figures, however good, are to be trusted only with all reserves.

Mitra (Costellaria ?) styria n. s.

Plate XV. Fig. 6.

Shell pale yellowish, white, or pinkish, sometimes with a faint peripheral brownish band, or mottled brown and white; elongated, acute, cancellately sculptured; nucleus elongated, pointed, glassy, pale brownish, smooth, of about three and a half whorls; other whorls 10–14, subconvex, with a distinct but not channelled suture; sculpture of about (on the last whorl) 25 slightly flexuous regular narrow even transverse ribs separated by wider interspaces, extending clear over the whorl; spiral sculpture of (behind the suture about 6–10) even threads, separated by squarely channelled narrower interspaces, crossing the ribs and with a tendency to form a nodule at the intersection; canal rather slender, with seven or eight strong spiral threads externally, which are crossed only by incremental lines; the tip of the canal is slightly recurved; internally the outer lip is thin, unreflected, and smooth; deeper in the throat are 6–10 fine spiral elevated liræ, ending in the adult in as many little knobs. On the body whorl near the angle with the outer lip, at certain stages, is a single small elevated callus; over the surface and on the column the callosity is thin; the pillar has three well-defined plaits behind its own margin, the posterior the largest; the completely adult may have two more. Lon. of shell, 19.0; of aperture, 7.0; max. diam. of shell, 5.0 mm.

Habitat. Gulf of Mexico, off Havana, in 119 fms.; at Station 32, in 95 fms.; Station 36, in 84 fms.; at Barbados, in 73–100 fms.; off St. Domingo, at Station 185, in 333 fms.; Station 262, in 92 fms., near Grenada; and by the U. S. Fish Commission at Station 2646, near Cape Florida, in 85 fms., sand. Bottom temperatures at the above stations, 44°.0 to 70°.75 F. Specimens dead, but in most cases fresh, and probably lived at the depth stated.

This species varies in the relative strength of the ribs and spiral threads, and the prominence of the intersections; some specimens are more attenuated than others. The measurements of the description are taken from the most perfect specimen, but, judging from fragments, it attains a size one third larger, and the adult will be proportionally somewhat stouter.

This species recalls *M.* (*Turricula* ?) *longispira* and *nasuta* Sby., and *casta* A. Adams. It has less flexuous ribs, which are not shouldered against the suture, more rounded whorls and a longer canal than any of the above as far as one can determine by the figures in the Thesaurus. A pale pinkish-white variety has the maximum number (10) of spiral riblets behind the termination of the suture, and in this form the cancellation is less marked than in the majority, which have the spiral about equal to the transverse ribs.

Mitra (Costellaria ?) Deshayesii REEVE ?

Mitra Deshayesii Reeve, Conch. Icon., fig. 170, 1844.
Mitra rustica Sowerby, non Reeve; Thes. Conch., fig. 143, 1874.

The single imperfect specimen which I refer with much doubt to the above species, while strongly resembling Sowerby's figure, differs from it in having the aperture strongly internally lirate, and between the ribs spiral threads, hardly visible on the ribs; there is an impressed line before the suture, which indents the ribs, forming a sort of margination to the suture; there are half a dozen strong spiral threads on the canal; the color is chestnut with a pale band above the periphery, and there are three plaits on the columella. The original *Deshayesii* is reported from the Red Sea.

Mitra (Costellaria?) Rushii n. s.

Mitra Rushii Dall, Conch. Exchange, II. p. 9, July, 1887.

Shell small, evenly fusiform, dark brown, bleaching to pale brown or yellowish; nucleus smooth, large, obtuse, of one and a half brown glassy whorls; other whorls about six, not convex, the last more than half the length of the shell; suture well marked but not channelled; sculpture of narrow even numerous flexuous ribs (about four to 1.0 mm.) extending clear across the whorl and having about equal interspaces; spiral sculpture of fine even close-set lines which do not cross or are obsolete on the ribs, and a few impressed lines cutting the ribs near the anterior end of the last whorl; aperture short and rather wide, the outer lip simple, not thickened or reflected, the throat strongly lirate; a small callosity near the angle of the outer lip on the body whorl, and three stout plaits on the short columella. Lon. of shell, 8.75; max. lat. of shell, 3.0; lon. of aperture, 3.75 mm. The majority of specimens are about half as long as this one, and proportionately stouter.

Habitat. Near Sand Key, Cuba, in about 80 fms. Dredged by the U. S. Fish Commission at Station 2372, in the Gulf of Mexico, in 27 fms., gravel, and off the Carolinas at Stations 2595, 2596, 2607, 2608, 2612, 2616, 2617, and 2619, in from 14 to 63 fms., gravel, bottom temperature from 67°.0 to 75°.5 F.

This little shell resembles no recent species I find figured; perhaps *M. æthiopica* Jickeli, from the Red Sea, comes as near as any. *Volutomitra wandoensis*

Holmes, of the Carolina Post Pliocene, would seem to be related to it. The simplicity and elegance of the sculpture are remarkable. It is named in honor of Dr. W. H. Rush, U. S. N., who has made praiseworthy collections of shells in the Antillean region.

Mitra (Costellaria?) trophonia n. s.

Shell elongated, with a Stilifer-like nucleus of five or more whorls, acute, yellowish brown, polished, glassy, and about eight other normal moderately rounded whorls; the last whorl forms more than half the shell; sculpture of about (on the last whorl) fourteen sharp little-elevated ridges, which are rounder on the earliest whorls and obsolete on the last half of the (adult) last whorl; incremental lines irregularly prominent; spiral sculpture of fine faint grooves, most visible between the ridges, three or four ill-defined distant revolving ridges on the anterior part of the last whorl which make a sort of arch in the transverse ridges when the latter cross them, and two to four ridges on the canal corresponding to the plaits; siphonal fasciole prominent and well marked; suture distinct, not deep, waved by the ends of the transverse ridges; color from pale yellow to deep orange, with a narrow opaque white band a little way behind the suture, which swells a little where it crosses the transverse crests, and may in some specimens be represented by a series of spots on the crests; surface rather glossy; aperture narrow, outer lip thin, sharp, with faint fine liræ in the throat; a small callus at the posterior angle on the body whorl; plaits four, the first rather small; canal nearly as wide as the aperture, somewhat recurved. Lon. of adult shell, 20.0; of last whorl, 12.0; of nucleus, 2.0; max. lat. of shell, 6.75 mm.

Habitat. Station 132, in 115 fms., broken shell, off Frederickstadt, Santa Cruz, bottom temperature 65°.0; Station 247, off Grenada, in 170 fms., ooze, bottom temperature 53°.5 F.

The peculiarly rude aspect resulting from the irregular incremental lines and the sharp-edged transverse ridges is characteristic, and resembles somewhat that of certain species of *Trophon* or *Anachis*. I have not been able to find in the monographs, or elsewhere, any species which could well be compared to this one in sculpture. It is quite possible that its color varies.

The nearest species to *M. trophonia* is *M. albocincta* C. B. Adams, which is much stouter and stumpier, with wider and rounder transverse ridges, rounder form, and less acute and laterally flattened spire. It is also considerably smaller, with a shorter canal in proportion, and is black in all the specimens I have seen, without exception, and shows no tendency to paler variations. *M. trophonia* has also a faint distant resemblance to *M. Defrancei* Payraudeau.

Mitra (Turris ?) Bairdii Dall.

Shell waxen gray or greenish, elongated, acute, with ten or eleven flattened whorls; nucleus? (wanting); sculpture consisting on the earlier whorls of up to fourteen little raised hardly flexuous transverse waves extending clear across the whorls, rounded, equal throughout their length, and separated by shallow slightly wider interspaces; this transverse sculpture becomes gradually fainter, and entirely obsolete on the last whorl, which in the adult seems only marked by the fine and slightly irregular incremental lines which give to the thin smooth pale brown and slightly fibrous epidermis a silky appearance; spiral sculpture of numerous very fine close half-obsolete grooves or scratches, and six or seven deeper stronger grooves encircling the canal; whorls mostly flattened, the last slightly rounded; suture distinct, appressed; aperture white, the outer lip thin, sharp, with no liræ on the typical specimen; column with three plaits, the anterior one faint; canal short, nearly as wide as the aperture, hardly recurved; siphonal fasciole distinct; soft parts whitish, with no operculum. Lon. of shell (nuclear whorls lost), 35.0; of last whorl, 17.0; of aperture, 12.0; max. lat. of shell, 9.0 mm.

Habitat. 100 miles S. E. by S. ½ S. from Cape Fear, N. C., in 528 fms., yellow mud, bottom temperature 38°.7 F. Dredged by U. S. Fish Commission steamer Albatross, one living specimen, at Station 2628.

The soft parts are so contracted that they could not be extracted without breaking the shell. This species looks a good deal like a *Terebra* in form. None of the described species at all resemble it.

Mitra (Thala?) torticula n. s.

Plate XV. Fig. 8.

Shell elongated, acute, pale yellowish, paler toward the extremities, with a dehiscent thin fibrous epidermis, its axial line somewhat convex toward the right; nucleus glassy, white, mammillate, of two whorls; other whorls about six, of which the last forms more than half the shell; sculpture of (on the last whorl) 12 rounded straight ribs, widest near the periphery, extending across the whorls and fainter near the suture and on the canal; these are crossed by about (on the last whorl) 16 rounded even threads, which pass over the ribs and interspaces without any marked nodulation and are separated by wider interspaces; suture not impressed; aperture narrow; outer lip thin and simple except for slight crenulation due to the sculpture; columella straight, acute anteriorly; no callus on the body or pillar; plaits two, distinct but not strong. Lon. of shell, 12.2; max. lat. of shell, 4.0 mm. Soft parts dried up within the shell, inaccessible, but apparently without an operculum.

Habitat. One living specimen from off Havana, Cuba, in 400 fms., bottom and temperature not determined.

The form of this shell (apart from its departure from a straight line) recalls *Mangilia* more than *Mitra;* the two plaits are well inside, so that they would seem to be true plaits, and not mere callosities. It is possible that it should be referred to *Cordieria*, but the aspect is more like *Mitra.* Its permanent place will depend on the results of the future dismemberment of the doubtless now heterogeneous group named *Thala* by H. & A. Adams.

Subgenus CONOMITRA Conrad.

? *Conomitra* Conrad, Am. Journ. Conch., I. p. 25, 1865.

Shell stout, short, like a short *Bela;* spire obtuse with a relatively large shelly mammillate nucleus; outer lip straight, simple, smooth inside; columella nearly straight with 3–5 rather strong plaits enlarging backward; no posterior notch; siphonal notch deep; surface smooth or axially plicate or reticulated.

This group resembles *Microvoluta* Angas, but in that the siphonal notch is wanting or obsolete, and the general form more elongated; in *Strigatella* and *Zierliana* the outer lip is armed, and the dentition of the columella is quite different. It differs from the type of *Conomitra* Conrad in its apex, in its simple outer lip, and in the absence of the peculiar anterior attenuation. I have not been able to find any other group into which it would fit in a satisfactory manner, and have decided to use Conrad's undescribed name for it; I do not feel positive that it really belongs in the *Mitridæ*, yet its form, plaits, and nucleus seem more allied to such forms as *M. Hanleyi* Dohrn than to *Enæta* and the other connections of *Voluta*. The colors are exactly those of *Enæta*. It is possible that there may be a caducous nucleus, and that the mammillary tip is merely the consolidated base thereof; this cannot be determined until quite young specimens have been obtained. My impression is, however, that the apex is naturally mammillate, as in *Mitra Hanleyi*. The species like *M.* (?) *styria* have an elongated rather acute translucent nucleus of three or four whorls, like a little *Assiminea*, which is usually lost. This may be a character of *Turricula*.

The type of *Conomitra* Conrad, on which, in default of any diagnosis, the subgenus must rest, is *Mitra fusoides* Lea (Contr. to Geol., p. 169, t. vi. fig. 176, 1833). *C. staminea* and *C. vicksburgensis* Conrad, the latter being unfigured, are probably mere varieties of Lea's shell, which was derived from the Claiborne beds. The differences between them are such as I observe between my specimens of *C. Blakeana*. The simple unlirate outer lip of the latter may be due to the period of growth; at all events, I prefer to retain the recent form with *Conomitra* until there is more material available upon which to base a final decision. This is the more desirable since the Miocene *C. angulata* Heilprin, from the Tampa silex beds, with the smooth outer lip of the recent form has the small pointed apex of the Eocene type.

Conomitra Blakeana n. s.

Shell columbelliform, short, stout, the aperture equalling or exceeding half the shell; apex large for the shell, mammillate; whorls about six, their posterior faces well rounded and somewhat turrited between the sutures; the elevation of the spire different in different specimens; sculpture of numerous close stout transverse ribs with very narrow interspaces, incremental lines rather well marked; spiral sculpture of rather strong threads, strongest on the anterior part of the whorl and obsolete behind the periphery; aperture narrow, outer lip thickish, not reflected, smooth inside; body whorl free from callus; columella with four strong subequal plaits and one or two obscure anterior folds; color whitish or brownish when faded, plum color and white variegated when fresh. Lon. (of two specimens) of shell, 10.0 and 8.0; of aperture, 6.25 and 5.50; max. lat. of shell, 5.0 and 4.6 mm.

Habitat. Yucatan Strait, 640 fms., two dead specimens.

This form is related to *Conomitra minima* Seguenza, Form. Terz. Reggio, p. 101, pl. xi. fig. 4, 1879, but is about twice as large. The latter is from the Tortonian division of the Sicilian Miocene.

Conomitra Blakeana var. lævior.

Plate XXXV. Fig. 10.

Shell resembling the preceding in form and size, but smooth or with but few faint plaits on the apical whorls; color orange, or flaked and clouded with opaque white, or marbled like *Meta cedonulli;* the spiral threads are absent except a few on the canal; the whorls are more appressed and the appearance of the spire less stumpy. Lon. of shell, 9.75; max. lat. 4.6 mm.

Habitat. Stations 57, in 177 fms., and 62, in 80 fms., off Havana; dredged by Sigsbee while in search of *Pentacrinus.* Also in 300 fms., mud, off Cape San Antonio, by Dr. Rush.

This must be a charming shell when in good order, and apparently must inhabit moderate depths of water.

Genus MITROMORPHA Adams.

Mitromorpha A. Adams (Cpr.), Ann. Mag. Nat. Hist., 3d ser., XV. p. 182, March, 1865. (*M. filosa* Cpr.)

This group, though indicated, seems not to have been characterized by either Adams or Carpenter, and it may be well to indicate its chief features. The form of the typical species is biconic with a globose nucleus, a narrow aperture very slightly or not at all notched behind, a nearly straight columella on which (1) the spiral riblets of the sculpture may run into the interior; or (2) may be overlaid with a smooth layer of callus; or (3), while in either condition, may have two faint oblique ridges on the column, which, however, are not continuous within the shell. The outer lip is thickened, but not reflected, and lirate or denticulate a little way within the margin. The nucleus is like that of some of the small Mitras, the shell (as in *M. dormitor* Sby.) recalls *Columbella, Conus, Cithara,* etc. The spiral sculpture is usually stronger than the transverse. My own impression, subject to modification with greater knowledge, is that these shells are related to *Mitra* rather than *Daphnella*, etc.

The species about to be described is more like *Mitra* conchologically than are the Californian species.

The genus is known from Japan, California, and the Antilles.

Mitromorpha biplicata n. s.

Plate XXXV. Fig. 1.

Shell small, biconic, cancellated, yellowish or whitish or with brown flammules; nucleus glassy, white, globose, of one and a half turns; other whorls five or six, hardly rounded; sculpture of about (on the last whorl) sixteen spiral squarish riblets with about equal interspaces, in which near the aperture of the adult a fine intercalary thread appears; the spiral sculpture is crossed by incremental lines and numerous faint rounded transverse ribs which go nearly across the whorl, but which are chiefly evident through the rounded waves they form on the spiral riblets, especially behind the periphery of the whorls; suture hardly distinguishable; aperture narrow, outer lip lirate within, a little patulous; inner lip plain, with two strong plications near its middle, the posterior the largest. Lon. of shell, 7.0; of aperture, 3.5; max. lat. of shell, 3.0 mm.

Habitat. Barbados, in 100 fms.

None of the specimens had completed the thickening of the outer lip and the glazing of the columella which mark the adult state, but several were very near it. The surface of the shell is glossy except for the incremental lines. The colors much resemble in variations those exhibited by *Mitra fulgurita* Reeve.

FAMILY FASCIOLARIIDÆ.

SUBFAMILY FUSINÆ.

Genus FUSUS LAMARCK.

The *Fusacea* of the West Indies appear to be few in number of species, and rare as individuals. Omitting those already known to belong to other genera though described as *Fusus*, the following species appear to be known to inhabit the Antillean region: *Fusus closter* Philippi; *F. Couei* Petit (very close to *tenuiliratus* Dunker and probably a variety of it); *F. distans* Lamarck; *F. gradatus* Reeve (+ *Hartvigii* Shuttleworth); *F. muricoides* C. B. Adams; *F. nitens* C. B. Adams; *Fusus Schrammi* Crosse; and *F. sinistralis* Lamarck. *F. multangulus* Philippi is a *Muricidea*, *F. limbatus* Dunker a dwarf species of *Tritonidea;* both are good species. The two species of C. B. Adams are in need of more study. They have not been figured, but both were noted by me, when going over the Amherst collection, as rather peculiar. *F. muricoides* looks as if it might belong to the *Purpuracea.* It is colored somewhat like *Pleurotoma albocincta*, and the canal is closed and twisted up as in *Tritonium.* *F. nitens* reminded me of a young *Phos. Fusus perrugatus* Conrad (Florida, 1846) is better classified in the genus *Urosalpinx.* On the other hand, *Urosalpinx carolinensis* Verrill appears much like a *Fusus* of short and compact form. The species of *Fusus* described as new by Holmes, in the "Post Pleiocene Fossils of South Carolina," are all young shells of *Nassa, Columbella,* etc. The *Colus exilis* of Conrad, figured in the Pliocene part of the same work, is not known to me in a recent state. The species dredged by the U. S. Fish Commission along the eastern coast, with the exception perhaps of *Sipho glyptus* Verrill, belong to *Chrysodomus* and its subdivisions, or, at all events, not to *Fusus* proper. The researches of the Blake and the Albatross in the Gulf and Antillean region enable me to add several interesting forms to the list of known species, and new localities for some which have been regarded as rare.

Fusus timessus n. s.

Shell solid, waxen white, with nine and a half inflated whorls. Nucleus of two whorls, swollen, polished, the last whorl with sharp transverse riblets. Sculpture of sharply carinate spiral ridges, 6–8 on the earlier whorls, 11–15 on the last whorl, beside about 20 on the canal. On the last whorl, the four or five ridges in front of the suture are smaller than the others; there is generally a small sharp ridge between the pairs of large ones which becomes a fine thread if we follow it up the spire; on the canal all the ridges become less prominent anteriorly. On the apical whorls there are 10–12 transverse ribs, rounded, and only prominent toward the periphery; the ridges run over these without much change and the transverse riblets become fainter on the later whorls and usually vanish on the last one. The only other transverse sculpture is formed by the lines of growth, which are rather sharp and scalloped between the ridges, corresponding to serrations of the outer lip; the whorls increase rapidly in diameter, and the suture is deep but not channelled. The base of the last whorl is rather suddenly constricted, while the canal tapers rapidly. The aperture is small, surrounded by a continuous sharp lip-lamina which extends to the end of the canal. The outer lip is strongly serrate, corresponding to 12–14 strong internal liræ; the inner lip is also lirate, but the liræ are often broken up irregularly toward their outer ends. In the immature shell the lamina about the mouth and the lirations on the inner lip are of course absent. Max. lon. of shell, 88.0; of last whorl, 60.0; of aperture, 20.0; of aperture and canal, 55.0; max. lat. of shell, 33.0; of aperture, 15.0 mm.

Habitat. U. S. Fish Commission Stations 2134, south of Cuba, in 254 fms., sand; 2316, off Key West, in 50 fms., coral bottom, temperature 74°.0; 2404, in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Florida, in 60 fms., sand; and 2411, between Cedar Keys and the Dry Tortugas, in 27 fms., sand.

This is a very remarkable species; in the short and rapidly increasing spire, large body whorl, and rapidly tapering canal, it has no parallel among recent species. Its nearest relative, and doubtless ancestor, is the *Fusus Caloosaensis* Heilprin, from the Pliocene of the Caloosahatchie River, Florida, which has very much such a spire, but the whorls are appressed to the suture and the sculpture is markedly different in detail; the liræ of the outer lip are double, and the shell is usually smaller than in the present species.

In *Fusus timessus* the soft parts are white, the operculum thick and solid. Neither appears to differ from those ordinary to the genus.

Fusus eucosmius n. s.

Plate XXXV. Fig. 5.

This shell is close to *Fusus turriculus* Kiener, from the Chinese coast, and is best described by a comparison with it. The nucleus of *turriculus* is brown and swollen, the first whorl being larger than the one which succeeds it; in *eucosmius* it is smaller, white, and the second turn is larger than the first. *F. turriculus* with eleven whorls measures 110.0 mm. long and 30.0 in diameter. *F. eucosmius* with eleven whorls measures 85.0 by 23.5 mm. It has its mouth relatively as well as actually smaller than the Chinese species; the maximum diameter of the aperture in the latter enters 6.1 times into the total length, while in *F. eucosmius* it will enter 6.6 times. The average number of transverse ribs in *F. turriculus* is ten, in *F. eucosmia* eight, while in the latter they are usually more prominent, especially at the periphery, and the interspaces are deeper. The color of the Chinese form is yellowish white, but most of the Antillean specimens tend toward an orange hue like that of a ripe apricot. In other features the two species are very similar, except that the inner lip of *eucosmius* is always smooth, while in adult specimens of the Chinese shell the equivalent surface is strongly irregularly lirate.

Habitat. West Florida, in 60 fms.; Station 11, in 37 fms., near Cuba; Station 290, in 73 fms., sand, off Barbados, bottom temperature 70°.7. Also at U. S. Fish Commission Stations 2316, 2317, 2318, off Key West, in 45–50 fms., sand, temperature 75°.0, and 2402, in 111 fms., and 2411 in 27 fms., sand, in the Gulf of Mexico.

The specimens obtained by the Blake were all very young and imperfect. The characters of the species could not have been made out without an examination of the Fish Commission specimens, most of which were adult and living.

Fusus Couei Petit.

Fusus Couei Petit, Journ. de Conchyl., IV. p. 249, pl. viii. fig. 1, 1853.

Habitat. U. S. Fish Commission Stations 2411 and 2414, in the Gulf of Mexico between Tampa and Dry Tortugas, in 26–27 fms., sand.

This extremely neat little species is closely approached by *F. tenuiliratus* Dunker, of unknown habitat, which may prove to be a mere variety or abnormal form of our species.

Fusus distans Lamarck var. closter Philippi.

I can fully corroborate the remarks of Mr. Tryon in regard to this variety. It is absolutely indistinguishable from specimens from the Philippine Islands known to be varieties of *F. distans*. *F. Dupetit-thouarsi* of Kiener runs through a parallel series of variations.

Fusus halistreptus n. s.

Plate XXXV. Fig. 7.

Shell pure white, of about ten whorls. Nucleus decollate in the specimen; early whorls with 10–12 faint rounded transverse ribs which become nearly obsolete on the later whorls; lines of growth elevated, sharp, fluted and reticulated by the spiral sculpture, giving the surface a rasplike character; they are also gathered into a frilled band just in front of the suture, which they cut obliquely ; spiral sculpture of numerous fine threads, and on each whorl three to five stronger ones, more prominent and sharp-edged on the ribs; aperture small, surrounded with an elevated border; outer lip delicately lirate within, inner lip perfectly smooth, a distinct notch in the callus on the body at the posterior commissure of the aperture ; canal long, slender, subcylindrical. Max. lon. of shell, 80.0 ; of last whorl, 51.0 ; of aperture, 15.0 ; of canal in front of the aperture, 28.0; max. lat. of shell, 20.0 mm.

Habitat. U. S. Fish Commission Station 2655, living, in 338 fms., Little Bahama Bank, bottom sandy, temperature 47°.5 F.

This species recalls *F. Schrammi* Crosse, being about the same size and otherwise similar, but it is more drawn out, the whorls are rounded and full, and they are not angulated by the prominent peripheral thread which replaces the carina of *F. Schrammi*. The gathered oblique lamellæ at the suture are also peculiar.

The soft parts are white except the eyes, which are remarkably large and black, and some of the internal organs. The tentacles are very short and small. The operculum and other features seem to resemble those of *F. colus* as figured by H. & A. Adams.

Fusus benthalis n. s.

Plate XV. Fig. 10.

Shell small, yellowish white, eight-whorled. Nucleus milk-white, polished, two-whorled, smooth. Spiral sculpture of (on the last whorl about 12) rather strong rounded threads, of which three appear on the upper whorls about equal and equidistant, riding over and becoming a little swollen upon the transverse ribs; between these are numerous small subequal close-set spiral threads; transverse sculpture of (on the last whorl about 12) equal even ribs, which fall away toward the sutures and on the canal; these ribs are wider than their interspaces, with a tendency to become nodulous where crossed by the strong spirals; both margins of the suture are bordered by a thread and appressed to each other in a wavy line; canal and aperture moderate; the outer lip lirate within; inner lip simple, with a light wash of callus; whorls moderately rounded. Max. lon. of shell, 15.0; of last whorl, 10.0; of aperture, 4.0; of canal in front of the aperture, 4.0; max. lat. of shell, 5.5 mm.

Habitat. Off Cape San Antonio, living, in 1002 fms. Station 5, near Cuba, in 152–229 fms., ooze, temperature 49°.5; off Sand Key, 15–128 fms; off Sombrero, in 54 fms.

This little shell appears to be abundant, and to have a very wide bathymetrical range.

Fusus amiantus n. s.

Plate XV. Fig. 11.

Shell pure white, with a straw-colored nucleus, ten-whorled. Spire rather acute, whorls obliquely smoothed off in front of the sutures. Nucleus four-whorled, above smooth, below sculptured with semilunar transverse ripples and a basal carina; spiral sculpture of very fine spiral threads, lightly decussated by wavy lines of growth; there are also two strong threads near the periphery, one lower which is obscured by the suture, and on the last whorl three, more anterior, beside the usual spiral sculpture of the canal; these strong threads become much more prominent, stronger, and sharply keeled, as they pass over the transverse riblets; transverse sculpture of eight rounded ribs, which appear near the periphery and extend over it on to the base; they are crossed by the spiral sculpture; suture appressed, wavy; the absence of ribs near the suture and the flattening of the shell there give this species a somewhat Pleurotomoid aspect, but there is no notch; canal moderate, strongly twisted; aperture smooth within, edges sharp, simple. Max. lon. of shell, 17.0; of last whorl, 10.3; of aperture and canal, 8.0; max. lat. of shell, 6.6 mm.

Habitat. Gulf of Mexico, at Station 2, off Havana, in 805 fms., bottom temperature 39°.75 F.

The nucleus of this little shell is peculiar, and the aperture is imperfect, but it is clearly different from any of the known species. There is something in the texture of the shell and the finer sculpture which recalls *Sipho glyptus* Verrill.

Fusus æpynotus n. s.

Shell small, slender, white, eight-whorled; nucleus milk-white, strongly transversely plicate below, above smooth, rounded; spiral sculpture of (on the last whorl 18) strong rounded threads, of which four or five are visible on the upper whorls; these are slightly swollen, but not keeled, where they pass over the ribs; between these are numerous fine close-set threads slightly marked by inconspicuous lines of growth. The transverse sculpture consists of (on the last whorl 10) rounded rather close stout ribs which pass clear over the whorl and are straight and slightly larger behind; suture appressed and wavy, conspicuous; canal stout, slightly twisted, aperture subovate, marginated; outer lip internally lirate with two or three strong denticles anteriorly; inner lip smooth, or slightly granulous. Max. lon. of shell, 24.0; of last whorl, 16.5; of aperture and canal, 12.5; max. lat. of shell, 9.0 mm.

Habitat. Station 36, in 84 fms., Gulf of Mexico; off Sombrero, in 70 fms. U. S. Fish Commission Station 2648, off Cape Florida, in 84 fms., green mud.

This species recalls *F. Bocagei* Fischer, dredged by the Travailleur in about 500 fms., but that species, from an authentic specimen, is shorter, stouter, with only seven transverse ribs and three principal spiral threads on the spire. The fine spirals in *F. Bocagei* are also more conspicuous. *F. æpynotus* has a little the aspect of *Fusus carolinensis* Verrill, especially the young ones, while differing in many details, especially the number and straightness of the ribs. Its nearest relative would seem to be a form named by Borson *Fusus lamellosus*, from the Tertiary of Modena; but this is merely the young of *F. rostratus*, and the adult has very different characters.

Fusus alcimus n. s.

Shell resembling the last species, but shorter and more acute at both ends, with only six much more oblique and proportionally stouter ribs, coarser revolving spirals, and none of the fine spiral striation which exists between the primary threads of *F. æpynotus*. It has eight whorls; the nucleus is strongly plicate below; the interspaces between the ribs are deep, and in them the spirals are much closer together than they are on the summit of the ribs; on the last whorl there is sometimes an intercalary single fine spiral thread. The color is yellowish with touches of dark brown; the canal is very short; the aperture is contracted, the lips much thickened, the outer one strongly internally lirate, the inner one smooth; the suture is inconspicuous and very much waved. Max. lon. of shell, 15.0; of last whorl, 9.2; of aperture and canal, 7.0; max. lat. of shell, 7.0 mm.

Habitat. Station 32, in 95 fms., 100 miles north of Yucatan, in the Gulf of Mexico.

Fusus alcimus var. **Rushii** Dall.

Shell smaller, pure white, nucleus hardly plicate, depressions between the ribs less deep, ribs less prominent and hardly oblique. Lon. of shell, 8.5; lat. 4.0 mm.

Habitat. West of North Bemini, Bahamas, in 200 fms., Dr. W. H. Rush, U. S. N.

Fusus ceramidus n. s.

Shell of a waxen or brownish yellow color, of a peculiar waxen subtranslucency, nine-whorled, strongly transversely ribbed, with obscure spiral sculpture and an imbricated band in front of the suture. Nucleus white, smooth, small but swollen. Transverse sculpture of seven or eight rounded ribs, stouter and more prominent on the early whorls, and on most of them not quite reaching the suture; also sharpish lines of growth which in front of the suture are elevated into flattish somewhat irregular imbricated scales, forming a narrow band in front of the suture. Spiral sculpture of primary and finer secondary threads, one or two of the former, near the periphery, becoming sharper and more prominent as they pass over the ribs; on the later whorls all the spiral sculpture has a worn or partially obsolete appearance. Aperture large, canal moderate, curved to the left; outer lip not much thickened, internally lirate; a callous ridge on the body, near the outer lip; the inner lip smooth, or with a few liræ near the canal. Max. lon. of shell, 46.5; of last whorl, 32.0; of aperture and canal, 26.0; max. lat. of shell, 18.7 mm.

Habitat. Stations 272, 273, and 290, at Barbados, in 73–103 fms., sand, bottom temperature 60° to 71°.0 F.

This is a peculiar species and easily recognized by the color and imbricated band before the suture.

Fusus amphiurgus n. s.

Shell small, eight-whorled, yellowish, translucent, with spiral touches of reddish brown; nucleus polished, smooth, brownish, two-whorled; transverse sculpture of fine sharp distinct incremental lines, and 9–10 narrow rounded subequal ribs, with wider interspaces, and somewhat broader anteriorly than near the suture; spiral sculpture of, on the periphery, two primary threads stronger than any of the others, swollen, keeled, and opaque white where they pass over the ribs; between these and the suture behind are three or four smaller threads with touches of brown in the interspaces; in front of the periphery and between it and the canal are about six more smaller primary threads, and others which cover the canal; between these on the whorl are from one to four extremely fine secondary threads. Owing to the difference in the size of the primaries the upper surface of the whorls slopes, roof-like, to the periphery, and this, with the white noduled peripheral threads, is the most striking feature of the shell; the aperture is rounded, the outer lip internally lirate, the canal slender and well differentiated. Max. lon. of shell, 14.0; of last whorl, 9.0; of aperture and canal, 7.3; max. lat. of shell, 6.5 mm.

Habitat. Gulf of Mexico, at Station 45, in 101 fms., bottom temperature 62° F.

This little shell is immature, and is described with some hesitation for that reason, yet it does not show characters like those exhibited by the young of any of the known species, and it seemed best to put it on record by giving it a name. Its nearest relative is *Fusus pulchellus* Philippi, of the Mediterranean, from which its most obvious distinction lies in its lighter color, more delicate texture, and the peculiar bevel of the upper surface of the whorls. In *F. pulchellus* the whorls are rounded and full, and the spiral sculpture coarser and sharper.

SUBFAMILY FASCIOLARIINÆ.

Genus FASCIOLARIA LAMARCK.

Fasciolaria distans LAMARCK.

Two young shells were dredged off Sombrero, in 54 fms.

The more southern specimens of this shell are paler than those from the United States. A specimen received from Balize is almost destitute of revolving color lines and is of a very pale salmon-color. The species is perfectly distinct from any of the varieties of *F. tulipa.*

Subgenus MESORHYTIS MEEK.

Mesorhytis Meek, Inv. Pal. Upper Missouri, pp. 356, 364, 1876; type, *Fasciolaria gracilentis* Meek; Cret.

Mesorhytis Meekiana n. s.

Plate XXXVI. Fig. 7.

Shell elongate-fusiform, thin, pale waxen or brownish, glossy; nucleus blunt, globose, of about one whorl; other whorls seven or more, little rounded, the second, third, and fourth showing 8–10 sharp high transverse ribs, a little shouldered behind, and crossed by fine spiral threads and grooves most distinct on the posterior side of the whorl; one of the threads is stronger than the others and angulates the ribs in crossing them; the sculpture becomes obsolete or nearly so on succeeding whorls, the fine distant grooves persisting longest; specimens differ in this respect; usually the succeeding whorls are smooth except for incremental lines, appressed toward the suture and with a little fine spiral grooving on the canal; aperture elongated, acute behind; outer lip smooth, thin, and sharp; canal about half as wide and nearly as long as the aperture, slightly recurved; columella without callus, somewhat flexuous; at its middle are three plaits, the largest being posterior, very thin, elevated, and somewhat oblique. Lon. of shell, 15.5; of aperture, 9.0; max. lat. of shell, 5.0 mm.

Habitat. Off Morro Light, Cuba, 250–400 fms.; Gulf of Mexico, Station 16, 292 fms., and Station 20, in 220 fms., bottom temperature 62°.0 F. Though not containing the soft parts, the specimens were fresh, and probably lived at these depths. They seem not completely mature.

The very young, owing to its sculpture, might be taken for an immature *Mitra*, but the shell when older is very characteristic. It is the first living species of the subgenus which has been reported.

Genus **MAZZALINA** Conrad.

This group is known only from a single Eocene species, *M. pyrula* Conrad, which I agree with Messrs. Fischer and Tryon in regarding as nearly related to *Lagena*, having recently examined the original type. Another shell, which has recently been referred to this group, is of a good deal of interest, and represents without doubt a new generic type.

Genus **LIOCHLAMYS** Dall.

Shell resembling a *Fasciolaria* of the type of *F. distans*, but short and globose, with a short curved canal, three plaits on the column, and the usual features of *Fasciolaria*, but entirely covered over in the adult with a coat of enamel which obscures the sutures, and as it were varnishes the whole shell. The mantle in this form must have been prolonged, as in *Dipsaccus* or *Cypræa*, so as entirely to hide the shell.

Type, *L. bulbosa* Dall = *Mazzalina bulbosa* Heilprin, Trans. Wagner Free Inst., I. p. 76, plate ii. fig. 7, 1887. Pliocene of the Caloosahatchie beds, Florida.

The original specimen of Prof. Heilprin was somewhat decorticated, and the usual spiral sculpture of the canal and anterior part of the shell running into the aperture, where the enamel had been lost, gave somewhat the aspect of the grooving of *Lagena* or *Mazzalina*. In perfect specimens nothing of this sort is to be seen. The shell is a short bulbous *Fasciolaria*, covered with a coat of enamel brilliantly polished. This species is found with many other rather deep-water species, of which several are in the Albatross dredgings. It would not be very extraordinary if future dredgings in the Gulf of Mexico should bring it to light in the recent state.

Genus **LATIRUS** Montfort.

The following species, though not obtained by the Blake, form part of the fauna of this region. *Leucozonia cingulifera* Lamarck (sometimes 70.0 mm. in length) which extends from the Florida Keys to the Isthmus of Darien. By a typographical error transplanted into Mr. Tryon's Manual (Vol. III. p. 96), it was referred to as *L. cingulata* by Mr. W. W. Calkins. The latter is a West American species, of which no trace has ever been found in Florida. *L. ocellata* Gmelin also reaches the Keys, though rare ; *L. dubia* Petit is a variety of it *L. triserialis*, to which Tryon refers *L. dubia*, is confined to the eastern Atlantic. *L. multangulus* of Tryon (after Philippi), as we have elsewhere shown, is a

Muricidea. In the genus *Latirus*, *L. infundibulum* Gmelin, *L. brevicaudatus* Reeve, and *L. cayohuesonicus* Sowerby are Antillean, the last named being the only one known to reach the Keys. *L. maderensis* Watson, *L. fastigium* Reeve, and *L. contemptus* A. Adams are stated to be West Indian, but I have not seen any authentic specimens of them from that region.

Family BUCCINIDÆ.

Subfamily CHRYSODOMINÆ.

Genus CHRYSODOMUS Swainson.

Subgenus SIPHO Mörch.

The name *Chrysodomus* is the first which, according to the rules of nomenclature, can be properly adopted for the group typified by *Fusus antiquus* of Lamarck, *Neptunea* and other names in common use never having been defined or diagnosed for this group until long after *Chrysodomus* had been proposed by Swainson. This group has been united with the *Buccinidæ*, and there are many points of resemblance, but it is a question whether it would not be more correctly regarded as a subordinate part of a family which shall include the genus *Fusus* properly so called, with, on the one hand, *Chrysodomus* and its allies, and, on the other, *Fasciolaria* and its allies, each group being rated as a subfamily. Numerous characters link these subfamilies together; and the features of the dentition, which formerly seemed so remarkable, and which were assigned as a sufficient reason for uniting the group with the *Buccinidæ*, now that we begin to know of the dental characters in a much larger number of species, seem less and less distinctive.

There are a large number of arctic and archibenthal forms of the *Sipho* group. None of them are known to inhabit very warm water, where they are replaced by *Fusus* and *Fasciolaria.* In the deep water, however, a few mostly small species reach quite far south. A number of interesting forms have been described by Prof. Verrill, while some described from the other side of the Atlantic have turned up here without being at first recognized. Such are *Sipho Bocagei* Fischer, which has been described by Messrs. Verrill and Smith as *Sipho cœlatulus*, and of which a specimen 36 mm. long was dredged in 966 fms., off Jamaica, W. I., by the Fish Commission. The adult operculum shows that it is not a typical *Mohnia*, though that appendage is less pointed and acute than in most of the genus *Sipho.* Another species is the *Sipho Sarsii* of Jeffreys, which has been named *Fusus abyssorum* by Fischer from the Talisman dredgings, and *Sipho profundicola* V. & S., from the Fish Commission dredgings. What seems to be a very slender variety of this species was also obtained at the same station off Jamaica, and very young specimens off the Floridian and Georgian coast.

Sipho Rushii n. s.

Shell small, thin, white, elongated, with a furfurescent epidermis and six whorls. Nucleus regular, white, smooth, but becoming gradually spirally striate; whorls well rounded, suture distinct; spiral sculpture of (between the sutures 5) primary threads, with a smaller thread in the intervals and finer ones on the anterior part of the last whorl and canal; these are crossed by fine flexuous lines of growth which decussate the threads, or give them, in strongly sculptured specimens, a somewhat beaded look; there are also 12–15 faint flexuous ribs crossing the whorl, tending to become obsolete on the last half of the last whorl, and more marked on some specimens than on others; these are quite concave at and behind the periphery; canal short, narrow, twisted to the left; columella rather concave; aperture entirely simple, with no visible callus; operculum rather wide and short. Max. lon. of shell, 11.0; of last whorl, 7.5; of aperture and canal, 5.5; max. lat. of shell, 4.5; of aperture, 1.25 mm.

Habitat. Station 2644 of the U. S. Fish Commission, off Cape Florida, in 193 fms., sand, bottom temperature 43°.4 F. Also in 205 fms., off Fowey Rocks, in the Straits of Florida, by Dr. W. H. Rush, U. S. N.

This is a delicate and pretty little shell, which is, in its general characters, very much like the young state of *Tritonidea limbata* Philippi (+ *Fusus pulchellus* Pfr. non Phil.); but that is more strongly sculptured and has a different nucleus, beside being clouded with color.

Sipho? (Ptychosalpinx?) globulus n. s.

Plate XXXV. Fig. 12 a.

Shell stout, short, white, spirally channelled, with about six whorls; spire short, whorls moderately rounded, apex rather blunt; nucleus small, depressed, glassy, smooth; spiral sculpture of (between the sutures) about a dozen broad flattened cinguli separated by narrower channelled interspaces, and covering very equally the whole shell; there are also a few faint spiral striæ, especially in the channelled interspaces near the aperture; transverse sculpture only of rather strong lines of growth, most evident in the channels. Suture very distinct; aperture elongate, arched, the outer lip thin, smooth, and hardly thickened inside; a little callus in the commissure and on the body and pillar; canal wide, very short, deeply notched, strongly twisted to the left; siphonal fasciole narrow but distinct, sharp-edged, producing false plaits under the columellar enamel; columella arched, its anterior edge sharply keeled. Operculum rather bluntly pointed. Max. lon. of shell, 31.0; of last whorl, 25.0; of aperture and canal, 21.5; max. lat. of shell, 20.0; of aperture, 9.5 mm.

Habitat. Station 2655 of the U. S. Fish Commission, in 338 fms., ooze, on the Little Bahama Bank, the bottom temperature 47°.5 F.

This shell is thin, and recalls *Oöcorys* as well as *Liomesus*. The nearest relatives, conchologically, are *Chrysodomus ventricosus* Gray, from Newfoundland, which is a much larger shell with a strong epidermis and longer canal, and the fossil shells named *Ptychosalpinx* by Gill, in 1867, of which *Buccinum Escheri* Mayer and *B. altile* Conrad are types.

The animal is pure white, and destitute of eyes. The tentacles are small, the proboscis extremely long; the verge is long, sigmoid, flattened, and has a small pointed process at the tip. The dentition resembles that of *Chrysodomus* (*Mohnia*) *Mohni* Friele (North Atlantic Exp., Report, Part I., plate v. fig. 14, 1882), but the teeth are wider, the laterals more arched, and it is certain that the rhachidian tooth has only one prong or cusp, while the laterals have no small denticles between the two terminal ones. If this specimen had not retained the soft parts I should have supposed it to be a *Liomesus*. The keeled columella is peculiar, though this feature is common to *Liomesus*, but the faint plait-like ridges above are merely the raised edges of the siphonal fasciole, showing through the enamel, and they disappear in adult specimens and are not present in some young ones.

Genus LIOMESUS Stimpson.

Buccinopsis Jeffreys, not Conrad.

Liomesus was defined before *Buccinopsis* Jeffreys, and would take precedence of it even if the name *Buccinopsis* had not been long preoccupied.

Liomesus ? Stimpsoni n. s.

Plate XXXV. Fig. 11.

Shell solid, strong, porcellanous; suffused with flesh color, lighter toward the apex; short-fusiform with the extreme apex a little flattened; six-whorled; nucleus minute, somewhat sunken, with the shell for two and a half whorls smooth polished and white; after this the sculpture gradually appears, and consists of spiral threads, or cinguli, smaller, rounder, and more distant anteriorly, wider, flatter, and closer posteriorly, except that in front of the suture there are one or two rather wider interspaces; beside this there are obsolete spiral striæ and rather strong lines of growth passing equally over the whole shell; epidermis thin, yellowish; the whorls are slightly flattened behind and squared off to the suture, producing a slightly turrited aspect, but the suture is not channelled; canal short, wide, deeply notched, producing a strongly marked but not swollen fasciole; aperture rather elongated, not wide, thickened within; on the pillar a moderate whitish callus, which is microscopically punctate, a thin wash on the body; the outer lip thick from the thickness of the shell, a little lirate by the sculpture close to the sharp edge, but not reflected; canal short, not recurved; pillar obliquely truncate, arcuate, keeled on the front edge. Max. lon. of shell, 32.5; of last whorl, 26.5; of aperture, 20.0; max. lat. of shell, 18.7; of aperture, 9.0 mm.

Habitat. U. S. Fish Commission Stations 2314 and 2625, off the Carolina coast, in 159 and 247 fms., sand, bottom temperature 46° to 47°.5 F.

February 28, 1889.

The specimens were perfectly fresh, but did not contain the soft parts. The generic place therefore remains a little doubtful. So far as the shell is concerned, it does not differ from *Liomesus*, unless in the somewhat narrowed aperture. In some respects the shell recalls *Dalium*, but wants the prominent band in front of the suture and is of a much more Buccinoid form. It is dedicated to the memory of Dr. Wm. Stimpson, the author of the genus, which was long erroneously included with the Buccinums.

SUBFAMILY BUCCININÆ.

Genus PISANIA Bivona.

Subgenus TRITONIDEA Swainson.

Pisania pusio Lin. (non Auct.) is widely spread through the Antilles, and was collected at Key West from the hermit crabs by Captain Pickering, U. S. N. It has many synonyms, and when young is strongly striated. These young with the epidermis on resemble *P. striata* Gmelin very much, and have been so labelled in collections, but the true *striata* (+ *maculosa* Lam. Tryon) is a Mediterranean form. To the dark striated variety of *pusio* are to be referred *P. æthiops* Phil. and *P. janeirense* Phil.

The transition between *Pisania* proper (*P. pusio*) and *Tritonidea* is easy. Take *P. pusio* var. *æthiops* and compare it with a small specimen of *T. variegata*, or a smooth variety of *T. tincta*, from which there is no difficulty in reaching *T. auritula* via the ribbed varieties of *T. tincta*. I can only regard *Tritonidea* as a subgenus of *Pisania*.

Of the group *Tritonidea*, the region under consideration affords *T. cancellaria* Conrad (+ *T. floridanus* Petit), *T. tincta* Conrad, *T. auritula* Link (+ *T. coromandelianus* Lam., + *T. ringens* Tryon non Reeve, + *lauta* Reeve,), *T. variegatus* Gray (+ *T. viverratoides* Orb.), *T. D'Orbignyi* Payr. (21 fms., off Cape Catoche, Yucatan), and *T. limbata* Phil., provided this last, elsewhere referred to in this paper, really belongs to this group. Of this list *T. auritula* is, so far as we know, Antillean; *T. cancellaria* extends from the Caribbean to Texas and Florida; *T. tincta* extends from Cape Hatteras southward to Mexico and the northern Antilles; *T. variegatus* is rare everywhere, but reaches the Florida Keys; while *T. limbata* and *D'Orbignyi* are known to me by specimens from only one or two localities. The *T. Haneti* of (Petit according to) Tryon is not, in my opinion, a *Tritonidea*. The *T. ringens* of Calkins and Tryon, from specimens submitted by those gentlemen, is *T. tincta*, pure and simple, and has no particular resemblance to *T. ringens*, which is a West American species.

Genus PHOS Montfort.

Notwithstanding the error of Mr. Tryon's statement that this genus is separated by good conchological characters from *Nassa*, I do not doubt its validity, but the differences are to be found in the soft parts and the operculum, not in the shell. The oblique basal fold of the columella, regarded as characteristic by Mr. Tryon, can be observed in nearly every species of *Nassa* which one may examine, and is, in fact, conspicuous.

But a very small amount of investigation in this case, as in many others, will show that, apart from the bare shells, there is much yet to be learned about almost all these animals.

Phos ? unicinctus Say.

Nassa unicincta Say, Journ. Acad. Nat. Sci. Phil., V. p. 211, 1826; Tryon, Mar. Conch., p. 35, fig. 55.

Nassa guadeloupensis Petit, Journ. de Conchyl., III. p. 56, pl. ii. figs. 3, 4, 1852 Krebs, Cat., p. 32; Beau, Cat., p. 11.

Nassa textilina Mörch, *fide* Tryon, Man., p. 220.

Phos guadeloupensis Arango, Fauna Mal. Cubana, p. 201, 1878; Tryon, Man., III. p. 219, pl. lxxxiii. figs. 512, 520.

Habitat. St. Thomas, C. B. Adams. St. Croix, Rawson. Shore at Curaçao, U. S. Fish Commission.

The South Carolinian habitat assigned by Say was doubtless accidental or erroneous. This shell has more the aspect of a *Nassa* than of a *Phos*, as these go, though considerably resembling the specifically distinct *Phos pallidus* of the west coast of America. But it has the operculum neither of a *Nassa* nor of a *Phos !* The operculum is lozenge-shaped, pointed in front and behind, with a nearly central nucleus and concentric elements much like those of *Buccinum* except in outline. In our present ignorance as to the character of the operculum in nearly all the species of *Nassa* and most of the species of *Phos*, I do not think it advisable to propose a new sectional name for this form, as it may very probably turn out to be characteristic of some of the sections of *Nassa* already named on conchological grounds.

Phos Beaui Fischer & Bernardi.

Phos Beaui F. & B., Journ. de Conchyl., V. p. 358, pl. xii. figs. 8, 9, 1860; Krebs, Cat., p. 32; Fischer, Cat. Beau, p. 10.

Habitat. Barbados, in 73–82 fms., at Stations 272, 290, and 293, bottom temperature 65° to 71° F.

The soft parts of this species are white, dotted with blackish toward the middle line of the foot above, and with the end of the siphon very dark brown. The eyes are very large in proportion to the size of the animal, are mounted on large long stout peduncles, from the inner side of the distal end of which proceed very slender acute tentacles. The foot is large, thin, with an entire edge and pointed linguiform tail-end. In withdrawing it into the shell it is doubled transversely in the middle. The operculum is like that of *Phos* as figured by H. & A. Adams. When entirely perfect the point terminates in a little claw-shaped process. The surface of the body is smooth and without accessory filaments or other processes. The specimen was not a male. The tentacles are not "connate at their bases" in this or the next species, any more than in any other Gastropod with retractile proboscis. The tail end of the foot had no filament, but was (in spirits) merely narrow and pointed. Fragments of this fine species, readily recognized by its polished surface, were obtained as above, and one broken but living specimen at Station 293.

Phos Candei Orbigny.

Cancellaria Candei Orbigny, Atlas to Moll. Cub., pl. xxi. figs. 23–25, 1842; text of the same, II. p. 129, 1847. (Not *Nassa Candei* Orbigny, *op. cit.*)
Phos erectus Guppy, Geol. Mag., 1874, pl. xvi. fig. 1 (extra copies, p. 8).
Phos Candei Arango, Fauna Mal. Cub., p. 201, 1878.
Phos antillarum Petit, Journ. de Conchyl., IV. pp. 238, 242, 418, pl. viii. fig. 9, 1853.
Phos grateloupianus Petit, *op. cit.*, p. 243, pl. viii. fig. 4, 1853.
? *Phos veraguaensis* Hinds, Ann. Nat. Hist., XI. p. 257, 1843; Voy. Sulph., p. 37, pl. x. figs. 13, 14, 1844; Tryon, Man., III. p. 219.
? *Buccinum zonale* Krebs, Cat., p. 31, 1864, as of Brugière.

Habitat. Off Sombrero, 54–70 fms.; Barbados, 80–100 fms.; Station 36, off Cuba, in 84 fms., bottom temperature 60°. F.; Station 128, off Santa Cruz, in 180 fms., sand, and Station 132, in 115 fms., rocky bottom, temperature 60° to 65° F.; Station 143, off Saba Bank, in 150 fms., temperature 63°.5; Station 167, off Guadelupe, in 175 fms., sand, temperature 55°.0; Station 155, off Montserrat, in 88 fms., temperature 69°.0, and Station 247, off Grenada, in 170 fms., ooze, bottom temperature 53°.5 F. Also at U. S. Fish Commission Stations 2145, near Aspinwall, in 25 fms., mud; 2403, in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Florida, in 88 fms., mud; and 2601, in 107 fms., sand, 36 miles S. $\frac{1}{2}$ W. from Cape Hatteras, North Carolina, bottom temperature 67°.4 F.

I doubt the identity of this species with that of Hinds from West America, but in any case the name and excellent figure of Orbigny have precedence, though the text of his description was delayed. I have no doubt that Mr. Tryon was correct in uniting the *Phos grateloupianus* of Petit with his *P. antillarum*. Most of the Antillean specimens are more like the figure of the former, said to be from Senegal, than like the pattern of that from the West Indies. There is probably some error about the figure or the habitat.

There is a small variety of this shell which is brighter colored and more finely sculptured than the more common form, but they intergrade. There is much variation in regard to the presence and position of varices, which are often entirely absent on the upper whorls. The operculum is like that of *Chrysodomus* or *Phos senticosus*.

The nucleus is glassy, sharply peripherally carinate, and has three to five otherwise unsculptured whorls. The soft parts and operculum are exactly like those of *Phos Beaui*, but there is less of the blackish dotting, even the siphon has not much.

Phos parvus C. B. Adams.

Triton parvus C. B. Adams, Contr. to Conch., p. 59, Jan., 1850.
Triton eximium Rawson, Carpenter *in litt.* as of Reeve.
Phos intricatus Dall, Hemphill's Shells, U. S. Nat. Mus. Bull., VI. p. 325, pl. x. fig. 9, 1883.

Habitat. West coast of Florida, to Key West. Vera Cruz, Mexico, Strebel. Progreso, Mexico, Mex. Sci. Commission. Bahamas, Rawson. Jamaica, Rum Cay, and Turk's Island, C. B. Adams. St. Thomas and Anguilla, in two feet of water among stones and corals, Krebs.

A visit to Amherst, where I was able to consult Prof. Adams's types, has enabled me to identify my *P. intricatus* with his *Triton parvus*. The *eximium* of Reeve is subsequent to Adams's name, and was described as from the Indo-Pacific region. They are probably not identical, though similar. The Floridian specimens are short, compact, with very prickly sculpture, and of a white or muddy gray color. The Antillean specimens are more slender and elongated, less prickly, and of a clear white, or banded prettily with light yellow brown or purplish, in a spiral direction.

Perhaps the less attractive Floridian kind may retain the name of *intricatus* in a varietal sense.

I have what is either a distinct species or a very marked variety of *P. parvus* in the National Collection, from the West Indies, but the specimen is not perfect enough for description. It has much the appearance and color of *Phos Beaui*, but is more sharply sculptured and is very little larger than the largest specimens of undoubted *P. parvus*. The sculpture has nothing of the imbricated prickly quality so marked in that of *P. parvus*.

Genus **NASSARIA** (Link) H. & A. Adams.

< *Nassaria* Link, Beschr. Rostock Samml., p. 123, May, 1807.
= *Hindsia* A. Adams, P. Z. S., 1853, p. 182; Fischer, Man., p. 631.
= *Nassaria* H. & A. Adams, Gen. Rec. Moll., I. p. 123, 1853.

The name *Nassaria* of Link, like the *Nassarius* of Duméril, was originally intended as a verbal emendation or improvement of the name *Nassa* of Lamarck. It was not intended as a new genus, but as an equivalent of one already existing. It was divided into two sections by Link, of which Section A contains as examples, in the order given, *Buccinum niveum* Gmelin, *Nassa papillosa* Lamarck, *N. reticulata* Lamarck, *N. ornata* Kiener, *N. exilis* Gmelin, *Phos senticosus* Montfort, and *Pleurotoma buccinoides* of Lamarck (= *P. sinuata* Born); Section B contains *Pisania tranquebarica*, *P. coromandeliana*, and *P. undosa* of Lamarck.

It will be seen that the larger number of the species were Nassas, and all of them looked like *Nassa*, as the name was used in those days.

But if we regard the name as having any right to stand in nomenclature, and proceed by a process of elimination, we find very soon that in 1853 the only unappropriated unit of this heterogeneous assembly is the first species. Rafinesque in 1815 had adopted *Nassaria*, but he did not define it, merely putting it next to *Nassa* and among the genera of his subfamily *Buccinidia*. Pfeiffer does not regard the *Buccinum niveum* of Gmelin as identifiable, and the figure is certainly far from good, but later the Adams brothers concluded that it represented a shell which one of them had just placed in a new genus, *Hindsia* A. Adams. It would doubtless have been better to have left *Nassaria* as an absolute synonym of *Nassa*, and retained *Hindsia* for the new group. But the brothers Adams were the first to revise it, and the most interested in the later name, and they did not adopt this plan; so perhaps science will best be served by accepting their decision, though much might be said on both sides.

The investigations of the Fish Commission and the Blake in Antillean waters and along the coasts of the United States have brought to light several species of a group nearly related to *Nassaria*, but which it seems necessary to distinguish by a subgeneric name. None of the typical Nassarias have so far been found in the region under consideration, but the present group seems to replace the typical genus in East American waters.

Subgenus NASSARINA Dall.

Shell with the general characters of *Nassaria*, but more compact, spindle-shaped and small, and with the aperture long and narrowed anteriorly, and the columella margin elevated and prominent, and united in the adult by an elevated callus with the outer lip on the body whorl. Soft parts unknown. Type, *N. Bushii* Dall.

To this group belong *N. Bushii*, *N. Grayii*, *N. columbellata*, all new species, and *N. glypta* Bush, which was described, with doubt, as a *Mangilia*. The group goes to the Miocene, if *Columbella ambigua* Guppy proves to belong to it. *N. glypta* is fossil in Floridian Pliocene.

Nassarina glypta Bush.

Mangilia? glypta Bush, Trans. Conn. Acad., VI. p. 461, pl. xlv. figs. 5, 5 a, 1885.

This is the smallest species of the group, and the figure above referred is unfortunately not a good one, the specimen being imperfect. In an adult specimen the aperture is a little more than two thirds as long as the whole of the last whorl. In the figure it is only about half as long as the whorl, and in so far does not well represent the mature shell, nor the peculiar anteriorly pinched aperture. This species has been found at U. S. Fish Commission Stations 2276, 2595, 2596, 2597, 2607, 2608, 2610, 2612, 2615, 2616, 2617, and 2619, off the coast of North Carolina, in 14–63 fms., sand, bottom temperature 67° to 80° F.

Nassarina Bushii Dall.

Plate XV. Fig. 12.

Shell white, strongly sculptured, six-whorled; nucleus shining, large, swollen, of one and a half whorls, at first smooth, later assuming fine spiral striation; the remaining whorls with (on the last whorl 8–10) strong subequal equidistant spiral threads nodulous on the summit of 9 or 10 strong rounded transverse ribs which cross the whorls; on the earlier whorls only three or four of the spirals appear, and the one nearest the suture is fainter than the others; the rib behind the aperture of the mature shell is somewhat swollen; the base of the last whorl is constricted at the beginning of the canal, which is short and sharply recurved; aperture contracted, surrounded with a thin elevated not reflected continuous margin, interrupted in the adult only by the canal; outer lip smooth, inner lip with three or four strong nodulous teeth; whorls rounded; suture distinct but not channelled. Max. lon. of shell, 9.0; of last whorl, 5.5; of aperture, 4.0; max. lat. of shell, 3.6 mm.

Habitat. Barbados, 100 fms.; Sand Key, Florida, 15–128 fms.; Station 5, Gulf of Mexico, near Cuba, in 152–229 fms., ooze, bottom temperature 49°.5 F.

This species is extremely like *N. glypta* Bush, on a larger scale, and without the pretty brown and white spiral coloration of that species.

Nassarina columbellata Dall.

Shell pure white, attenuated anteriorly, rather acutely conical behind, with eight whorls. Nucleus two-whorled, polished, smooth, milk-white, rather large; spire flatly conical with a conspicuous suture; upper whorls with about five strong close-set equal threads, most conspicuous in the interspaces between the numerous (on the last whorl 18) flattened transverse ribs, which cross the whorls but stop short before the sutures, giving a grooved aspect to the latter, which is increased by the existence of a peripheral line or space wider than any of the others between the two spirals nearest the periphery; last whorl attenuated toward the long canal, but not constricted as in the last species; aperture long, narrow, contracted, with an elevated continuous margin, interrupted only by the canal, which is recurved near its termination; outer lip with four or five internal teeth; inner lip with five or six finer smaller ones; whorls not rounded above. Max. lon. of shell, 12.2; of last whorl, 8.0; of aperture, 6.0; max. lat. of shell, 4.5 mm.

Habitat. U. S. Fish Commission Station 2367, off Cape Catoche, Yucatan, in 124 fms., sand.

The upper whorls of this shell are flattened and sculptured much like those of *Columbella similis* or *translirata*.

Nassarina Grayi Dall.

Plate XXXII. Fig. 12 a.

Shell solid, strong, yellowish white with darker brown spiral lines and about six whorls. Nucleus smooth brown; sculpture of numerous close-set spiral threads, of which about every third or fourth is stronger and darker colored than the others; transverse sculpture of stout ribs becoming obsolete behind the periphery, thus giving the whorl a shouldered aspect, there are nine or ten of these on the last whorl, extending well forward; the rib behind the aperture is varicoid and swollen; the spiral sculpture passes over the ribs, which are a little angulate at the periphery; the whorl is appressed to the suture, which in the upper whorls is more or less waved by the ends of the ribs behind it; the aperture is long, narrow, and somewhat contracted, the continuous margin less elevated than in the preceding species; the base of the last whorl is somewhat constricted, the canal is twisted, recurved, and with a strong siphonal fasciole; the outer lip has about seven teeth of which the hinder ones are the stronger; there is a rounded callus on the body and also a few denticulations on the anterior part of the columella. Max. lon. of shell, 12.0; of last whorl, 9.0; of aperture, 6.0; max. lat. of shell, 5.8 mm. A larger but imperfect specimen is 15.5 mm. long.

Habitat. Station 152, off St. Kitts in 122 fms., bottom temperature 67°.5. Stations 272 and 290, off Barbados, in 73–76 fms., coarse sand, bottom temperature 65° to 71°; and U. S. Fish Commission Station 2354, in 130 fms., coral, off the Arrowsmith Bank, Yucatan.

This is a rather short broad species, and has a little the aspect of a *Tritonidea*, but the pinched aperture suggests its reference to this group.

Family NASSIDÆ.

Genus NASSA Lamarck.

The species of this genus are well known to be extremely variable, and a large number of names have been applied to the varieties of the genus indigenous to the Antilles.

With a large series of specimens it is less difficult to set specific bounds as the varietal relations rapidly become evident. There may be a larger number of species in the region, but all the specimens I have seen are referable to one of six littoral or two deeper-water species of this genus. Curiously enough, of this small number four have fallen into neglect of late years, and one appears to be undescribed. *N. trivittata* does not appear to exist in a living state much south of Cape Hatteras, and does not appear in the Antilles. The species which occur are *Nassa vibex* Say,* *N. acuta* Say, *N. consensa* Ravenel, *N. Hotessieri*

* *N. unicincta* Say will be referred to under *Phos*.

Orbigny, and *N. ambigua* Montagu. *Ilyanassa obsoleta* Say, confined to the continental shore and not reaching the southernmost extreme of Florida, and an undescribed species mentioned later, make up the list. The deep-water *Nassa nigrolabra* of Verrill has not turned up in these waters yet, and I doubt the propriety of referring it to this genus. Indeed, it has, judging from the figure, the appearance of a larval shell, though without examining a specimen I would lay no stress on this suggestion. Its smooth unsulcate pillar, however, removes it from the genus *Nassa*, if it is adequately figured.

Nassa ambigua MONTAGU.

Buccinum ambiguum Mont., Brit. Test., pl. ix. fig. 7, 1803.
Nassa alba Say, Journ. Acad. Nat. Sci. Phil., V. p. 212, 1826.
Nassa antillarum Orbigny (not Philippi), Moll. Cuba, II. p. 141, pl. xxiii. figs. 1–3, 1845 (dark variety).
Nassa ambigua Orbigny, Moll. Cuba, II. p. 142.
Nassa Candei Orbigny, *op. cit.*, p. 142, pl. xxiii. figs. 4–6, 1845 (young shell).
Nassa candidissima C. B. Adams, Krebs, Cat. p. 32.
? *Nassa obtusata* Marrat, Argo Exp., pp. 16, 17, 1876 (not of A. Adams, an E. Indian species).
? *Nassa incrassata* Guppy, Geol. Mag., p. 447, 1874 (not of Ström, a European species).
? *Nassa pura* Marrat, New Forms of Nassa, p. 13, 1877.
Nassa annellifera Reeve, Conch. Icon. *Nassa*, pl. xxv. fig. 168, 1853; Marrat, Argo Exp. p. 8.
Not *N. ambigua* Dunker, W. Africa, = *N. incrassata* Ström.

Habitat. Yucatan Strait, 640 fms.; Station 2, 805 fms.; Barbados, 76–103 fms., including Stations 273 and 276; Station 142, Flannegan Passage, in 27 fms.; Station 155, off Montserrat, in 88 fms.; Station 210, near Martinique, in 191 fms.; off Sombrero, in 54 fms.; Sigsbee, off Havana, in 80 and 177 fms.; Bahamas; Bermuda; Dominica; Florida, Lower Matacumba Key, in grass below low-water mark (Hemphill); Key West, Goodland Point, and other localities in Florida from low water to 2 fms. (Hemphill).

The shells dredged by the Blake were all dead, and most of them occupied by Paguri; none of them probably lived below a depth of a few fathoms, above which it would seem that this must be one of the most abundant and widely spread of the Antillean species.

This is the commonest littoral species of *Nassa*, and its varieties have received many names. It has a different nucleus from the very similar *N. incrassata* of Europe and West Africa. It varies in the number of its ribs, their angulation in front of the suture, in being white or banded or speckled with brown, and in the strength of its spiral threads. The typical *ambigua* has numerous rounded ribs, not angulated, and evenly reticulated. The variety *antillarum* has the ribs fewer and stronger, and with a marked angulation which turriculates the whorls.

It is entirely different from *N. acuta* Say, which has been referred to it by Tryon. *N. acuta* extends on the southern coast from South Carolina to Texas, and I have received it from Barbados; it appears to be rare everywhere.

Nassa consensa Ravenel.

Nassa consensa Ravenel, Proc. Acad. Nat. Sci. Phil., 1861, p. 43.

Habitat. Off Charlotte Harbor, W. Florida, twenty miles, in 13 fms. (Blake). Off the coast from Florida to North Carolina living at moderate depths, 8–49 fms., and dead in 8–150 fms. (U. S. Fish Commission).

This species, as identified by Prof. Verrill, seems to me well defined and worthy of acceptation. Though its general form is very much the same as that of *ambigua*, its spiral sculpture is of an entirely different character; and its color painting, though variable in both species, has a distinctive character for each of them.

Nassa Hotessieri Orbigny.

Nassa Hotessieri Orbigny, Moll. Cuba, II. p. 142, 1845.
Nassa Hotessieriana Orbigny, *op. cit.*, Atlas, pl. xxi. figs. 40–42.
Nassa Hotessieri Orbigny, Voy. dans l'Am. Mér. Moll., 1840.

Habitat. Gulf of Mexico, Station 36, in 84 fms.; off Sombrero, 54–72 fms.; off Sand Key, 80 fms.; Station 2, in 805 fms.; U. S. Fish Commission Station 2596, seventeen miles E. S. E. from Cape Hatteras, N. C., in 49 fms.; and Station 2646, off Cape Florida, in 85 fms., gray sand. None of the specimens were living, though nearly all were perfectly fresh.

The specimen figured by Orbigny was quite young. The species grows even larger than *N. ambigua*, and is perfectly distinguishable from it, the chief and most obvious characters being the flattened whorls turrited by the application of the suture below a peripheral band, the close and uniform transverse riblets prickly nodulated by the revolving sculpture, which is weak or absent between the riblets, and the clean-cut channel behind the siphonal fasciole margined in front by a small sharp keel.

On the base of large specimens the spiral sculpture shows as grooves deep on one side and running out on the other, like those on a flat file, instead of the rounded threads characteristic of *ambigua*. In some specimens the transverse riblets become obsolete or irregular on the last whorl. The aperture is like that of *ambigua*.

Nassa scissurata Dall.

Shell short, conical, glistening, white clouded with light brown or buff; whorls stout, well rounded; nucleus of two translucent turns, smooth or transversely slightly wrinkled; remainder comprising five or six turns separated by a deep but not channelled suture; sculpture of (on the last whorl about fourteen) stout rounded ribs with wider interspaces, completely crossing the whorls, and fine incremental striæ; spiral sculpture of (on the last whorl about ten) revolving ridges, faint in the interspaces, strongly ovally noduled on the ribs, three rows showing on the upper whorls; ribs interlocking at the sutures; aperture rounded, with its edge continuous and raised, contracted in front of a stout varix, lirate on both sides, a stout tooth on the body and another at the base of the pillar; a deep groove behind the siphonal fasciole; canal short, strongly twisted. Operculum serrate at the sides. Lon. of shell, 12.0; of last whorl, 8.0; of aperture, 5.0.; max. lat. of shell, 7.5 mm.

Habitat. Station 272, at Barbados, in 76 fms.; Station 132, near Santa Cruz, in 115 fms., rocky bottom, temperature 65°.0 F. (living); Station 2, in 805 fms.; Station 206, near Martinique, in 170 fms.; Station 220, off Santa Lucia, in 116 fms., rocky bottom, bottom temperature 58°.5 F.

Nassa scissurata var. pernitida Dall.

Shell more slender and elongated, spiral sculpture weaker, hardly nodulating the ribs; ribs becoming obsolete on the last whorl. Lon. 16.5; max. lat. 7.5 mm.

Habitat. Station 299, near Barbados, in 140 fms.

This species is clearly distinguished from *N. Hotessieri*, which is its nearest relative, by the character of the sutures which are not channelled, by its fewer strongly nodulated ribs, and by the curve of the ribs, which in *Hotessieri*, as in most ribbed univalves, are convex forward on the periphery and then curve a little backward, while in *N. scissurata* the curve is in a contrary sense, as is at once evident on comparing two specimens. The total curve is not great, but quite sufficient to form a marked distinction.

This species has the bright waxen lustre of a deep-water shell, and probably lives in between 75 and 200 fms. depth. Its sculpture recalls that of *N. spinulosa* Phil.

Family COLUMBELLIDÆ.

Genus COLUMBELLA Lamarck.

Of the genuine typical Columbellas there are two abundant species in this region, *C. mercatoria* Lamarck and *C. rustica* Linné. The Antillean and Floridian specimens of the latter, though probably conspecific, have a markedly different facies from the Mediterranean variety, and have been called *rusticoides* by Heilprin in a recent paper on the Pliocene of the Caloosahatchie beds of South Florida. *C. rustica* is found in these beds precisely like the recent Florida form, for which it may be well to retain Heilprin's name in a varietal sense.

Most of the other species can be referred to one of five subgenera or sections of the genus, as follows: *Anachis*, *Astyris*, *Nitidella*, *Æsopus*, and *Conidea*. There is no doubt that the number of subdivisions in this group has been multiplied in excess of the needs of science or the indications of nature, while several subdivisions of importance have not been recognized. Even the above mentioned groups, or at least the first three of them, are connected closely by intermediate species. On the other hand, such a remarkable form as *C. turturina* Duclos, with internal plaits as pronounced as in *Turbinella*, has not been separated. For it I propose the sectional name of *Euplica*.

Subgenus ANACHIS H. & A. ADAMS.

Anachis avara SAY.

Columbella avara Say, Journ. Phil. Acad. Nat. Sci., II. p. 230, 1822.

This abundant and well-known shell extends from Massachusetts Bay to Cape Florida, always in shallow water. It is found in the Miocene of Maryland and Virginia (Conrad), and the Pliocene and Post Pliocene of the more southern coast. The variety *translirata* has been collected on the coast of Yucatan, but I have seen no specimens from the Antilles. Notwithstanding the common occurrence of this species, its range and typical form have not been very clearly realized by conchologists, judging from the labels of specimens received from many different sources.

The type is rather small, dull-colored, smooth, few (10) ribbed and spindle-shaped. Longer slender greenish specimens with these characters form the Floridian variety *semiplicata* of Stearns; many-ribbed acute bright-colored specimens are the (var.) *translirata* of Ravenel, more commonly regarded as the typical form of the species, as it is the most common, largest, and widespread; the dwarf form common to all species of *Columbella*, especially in this subgenus, is *C. similis* Ravenel, which is almost distinct enough to rank as a species, but differs only in size from var. *translirata*. It extends from Cape Fear to Yucatan, the Florida Keys, and probably to Cuba. I have seen no Antillean specimens.

Among the absolute synonyms of this species are *C. terpsichore* Greene, *Columbella Gouldii* Reeve (Conch. Icon., XXII. fig. 135), not Stimpson, and *Fusus minor* Holmes (Post Pliocene, S. Carolina).

Specimens dredged at New Bedford, Mass., had the foot long and slender, square cut in front, a little indented in the median line, linguiform behind. The tentacles are contractile, not sharp-pointed, but quite slender when extended, the eyes small, black, extending laterally without any peduncle at the outer bases of the tentacles. The siphon is rather large, subcylindric, without appendages, about one third as long as the foot, the proboscis more slender, tapering, and about the same length when fully protruded. The verge is sickle-shaped, slender, sharply pointed, flattened, and with its outer edge sharp. It is thrown back above the neck, the point lying at the right of the base under the dome of the mantle. The dentition is as usual, an edentulous obsolete central plate with a single broadish tridentate sigmoid lateral tooth on each side. The operculum resembles that of *Chrysodomus* in miniature, but the point is usually defective. It is attached to the surface of the foot by about half its own surface, which exhibits an ovate scar. Stimpson found the ovicapsules in 3 fathoms, on Sertularians, at Great Egg Harbor, New Jersey, August 7, 1864. They are about 1.0 mm. long and half as wide, on the ovate base; they are shaped like a compressed volcano or balanus, the crater of which is represented by a flat subcircular smooth apical disk, from the periphery of which radiate to the base about ten elevated thin, sometimes bifurcating ribs. There were about thirty ova in each capsule, which had already assumed the larval shell.

Beside this species, the following are known from the eastern and southern coast of the United States and adjacent waters, though the list is not claimed to be complete.

Anachis catenata Sowerby, Antilles, Yucatan, Vera Cruz.

Anachis haliœeti Jeffreys (*costulata* Jeffreys, Verrill, not of Cantraine), New England and northward, in deep water.

Anachis albella C. B. Adams (from type described as *Pleurotoma*, +*A. iontha* Ravenal and *A. acuta* Stearns), Cape Hatteras to Florida, low water to 50 fms. There is a variety (*A. samanensis* Dall) which differs from the commoner form by its fewer ribs, slightly longer canal, larger varix behind the outer lip, and smoother back to the last whorl. It has been received from Florida and the Keys, and Samana Bay, St. Domingo. The typical *albella* is smaller than the northern variety called *iontha* by Ravenel.

Anachis pulchella Kiener. (*C. costulata* C. B. Adams, not Cantraine, from type. This is wrongly referred to *catenata* Sowerby by Tryon.) Antilles and Florida Keys.

Anachis obesa C. B. Adams (*C. ornata* Ravenel, *C. cancellata* Gaskoin, *C. ostreicola* Melvill), North Carolina to Florida, Texas, and Vera Cruz; also the Antilles generally. The dark brown or black ones are var. *ostreicola*.

Anachis Hotessieriana Orbigny, has been obtained in 30 fms. near the Bahamas, and would appear to be a good species. It is the smallest of all, and has been reported from Cuba and Guadelupe.

When one reaches such species as *C. Verrillii* it is impossible to tell by the shell in which subgenus they should be located.

Anachis amphissella Dall.

Plate XIX. Fig. 10 c.

Columbella (*Astyris*?) *amphissella* Dall, Bull. M. C. Z., IX. p. 91, 1881.

Habitat. Yucatan Strait, 413–640 fms.

A variety (which may take the name of *Rushii*) of this species was dredged by Dr. Rush, U. S. N., off Fowey Rocks, Florida Straits, in 465 fms. It is distinguished from the type by the absence of the undulations or transverse riblets; the fine sculpture alone is left. Both have a notably large and translucent nucleus, much bigger proportionally than is found in any of the shallow-water forms. Its nearest relative seems to be *A. obesa.* These shells stand about midway between the subgenus *Astyris* (like *A. rosacea*) and the small forms of *Anachis*, and might equally well be referred to either section.

Subgenus NITIDELLA Swainson.

In the subgenus *Nitidella* we have in this region *N. nitidula* Sby., *N. cribraria* Lamarck, *N. lævigata* Linné, *N. parvula* Dunker, and *N. dichroa* Sowerby, the last two being somewhat uncertain as to their subgeneric affinities. Most of these species have numerous varieties and synonyms. *Columbella idalina* Duclos, a beautiful Antillean species, and *C. moleculina* Duclos, which extends to the Florida Keys where it was abundantly collected by Hemphill, have much the aspect of *Nitidella*, and perhaps should be referred there. To the last mentioned species I refer, as a variety, *dicomata*, a very pretty little form collected by Hemphill on the reefs at Key West. It differs from *C. moleculina* in being smaller, more distinctly spirally grooved all over, and in having the brown color (on a translucent ground) concentrated in two revolving brown bands, one above and the other below the periphery, the upper one alone being visible on the older whorls.

Subgenus ASTYRIS (H. & A. Adams) Dall.

Astyris (H. & A. Adams, 1853) Dall, Proc. Bost. Soc. Nat. Hist., 1870, p. 242; Am. Journ. Conch., VII., 1871, p. 115.

Out of a number of superfluous names, the present one was selected by me, nineteen years ago, to be used for sundry colored, small, mostly polished little Columbellids which have been scattered through a variety of sections which form phases of a continuous series and cannot be strictly diagnosed. Of this group there is a goodly number on both coasts of North America and in the Antilles. The species on the east coast of the United States would repay more study than they have received.

Astyris lunata Say.

Columbella lunata Say, Journ. Phil. Acad. Nat. Sci., V. p. 213, 1826; Tryon, Am. Mar. Conchology, p. 38, fig. 61, 1873.

This very common little shell has several absolute synonyms, among which are *C. Gouldiana* (Agassiz MS.) Stimpson and *Wheatleyi* DeKay. It has also several marked varieties. *C. dissimilis* Stimpson, of which the U. S. National Museum possesses typical examples, is a rude purplish brown rather large northern form of *lunata.* None of the specimens so labelled by Stimpson have any trace of white on them, or any light coloration. A form in which the brown coloration of the ordinary *lunata* coalesces to form two or more dark bands with lighter interspaces is the *zonale* of Linsley, but the banded specimens from off Hatteras in deep water, which have been referred to *zonale* by Prof. Verrill and Miss Bush, appear to me to be a distinct species, and have nothing to do with *lunata.* An unusually dark, stout, and stumpy variety from the Carolina coast has been determined from authentic specimens to be the *C. spizantha* of Ravenel. The coloration is much like that of the ordinary *lunata*, but the spots are more disconnected and squarer. A smaller, brighter, more polished, and elegantly colored pale variety is that which, following the general rule of species having a wide distribution, is found toward its southern limit in South Florida, Cuba, etc., northward to the Carolinas, and which has received the name of *C. Duclosiana* Orbigny. The typical *A. lunata* is abundant in Florida but does not extend south of it, and in South Florida is largely replaced by the variety *Duclosiana.* The latter farther north, as off the coast of the Carolinas, is found, not along the shore, like the typical form, but in 15–50 fms. water, in a temperature of 65° to 80° F.

The genuine deep-water or archibenthal species are distinguished, as far as I have been able to examine them, by a larger and more inflated nucleus than that carried by the littoral species. It is possible that, in the absence of violent struggle characteristic of life in the depths as compared with the shores, a large number of young in each capsule may become less necessary and the size of the individuals more important. Of these species we have *A. Raveneli* Dall (*C. nivea* Ravenel, not Sowerby), larger, more elongated than *A. pura,* and recalling a minute *A. rosacea* Gould. Dr. Rush dredged it in 205 fms., off the coast of Florida, and the U. S. Fish Commission at Station 2602, in 124 fms., sand, off Hatteras, the bottom temperature being 61°.0 F. So far as known, *A. pura* Verrill is more northern in its distribution, having been obtained in the deep water off the southeast coast of New England.

Another species is *Astyris multilineata* Dall, which has been referred to *A. lunata* var. *zonale* by some writers. It is longer, and proportionally more slender and acute, than any form of *A. lunata.* The whorls are less rounded, the spire has a somewhat flattened appearance, and the periphery is obscurely angulated, even in the last whorl of the adult. But the character which most clearly distinguishes it, in its typical form, is the coloration; which consists of five or six pale brown narrow even spiral lines, alternating with straw-colored interspaces, on the last whorl. From its uniformity in a large number of specimens this character seems to be stable and diagnostic. In dead shells the brown lines fade, and among live ones there is a pure white variety which is distinguishable from *A. Raveneli* by its form and smaller size (4.5 mm. long by 2.0 mm. wide, while *A. Raveneli* measures 5.5 by 2.2 mm., and *A. pura* about 4.0 by 2.5 mm.), and from *A. pura,* which is still smaller, by its more polished compact appearance and more slender form. *A. multilineata* has been obtained from U. S. Fish Commission Stations 2592, 2595, 2601, 2602, and 2614, in from 63 to 168 fms., sand, with a bottom temperature of 61° to 78° F.

Adult specimens have four or five well-developed denticles inside the outer lip, and a larger one at the beginning of the canal opposite a tooth-like callus on the pillar. The other characters are much like those of *A. Raveneli.*

Among the widely distributed forms which appear in deep water on our eastern coast is the *Astyris rosacea* of Gould. After examining a very fine geographical series, I have been unable to separate the Greenland shells from those of Norway, New England, or Alaska, all the characters which have been relied upon as diagnostic being mutable and interchangeable. The name *Holböllii* of Möller will therefore fall into synonymy. However, the slender shell called *diaphana* by Prof. Verrill I regard as entitled to specific rank, although the spiral lines are quite variable, and are distinctly visible on some of the specimens of *diaphana* received from him. The nucleus, as stated by him, is more compact, but this is a difference which alone could hardly be regarded as of specific value. The shell, however, has other characters, which are enumerated below.

Before leaving this topic, I may mention as an addition to our fauna the *Astyris fusiformis* Orbigny, an Antillean form, which was obtained in 6–10 fms. at Turtle Harbor, Florida, by that zealous collector, Dr. W. H. Rush, U. S. N.

Astyris diaphana Verrill.

Plate XXXV. Fig. 9.

Astyris rosacea (pars) Verrill, Proc. U. S. Nat. Mus., III. p. 408 (non Gould).
Astyris diaphana Verrill, Trans. Conn. Acad., V. p. 513, pl. lviii. fig. 2, 1882.

Shell of the form and general appearance of *A. rosacea* Gld. (*Holböllii* Moll.), but more slender, with a prominent swollen varix behind the outer lip, which is slightly thickened and finely lirate within. In front of the varix the suture descends quite sharply, or bends forward. The nucleus is white and like that of *A. profundi,* and there are five other whorls, which are marked with obscure elevated spiral lines, with irregular interspaces, which look as if scratched with a pin on the inside of the shell and showing through. These give the surface, which is polished and lightly marked with lines of growth, a malleated appearance. The anterior half of the last whorl is grooved, the grooves being stronger and wider in proportion as they are anterior; the interstitial elevations on the canal are like rounded threads. The suture is distinct but not channelled; on some of the whorls it is accompanied by a fine groove just in advance of it. The general color of the shell is pale straw-color, and the epidermis is not hispid like that of *rosacea.* Lon. of shell, 9.0; of last whorl, 5.6; of aperture, 4.0; max. lat. of shell, 3.3 mm.

Habitat. U. S. Fish Commission Stations 876, off Newport, R. I., in 65 to 487 fms., and 2399, in 196 fms., mud, between the Mississippi delta and Cedar Keys, Florida, bottom temperature 51°.6 F.

It recalls *A. profundi* Dall, but is more elegant, slender, and has more rounded outlines. There are no traces of transverse ribbing.

Astyris profundi n. s.

Plate XXXV. Fig. 3.

This shell has nearly the same form as *Astyris Holböllii* or *rosacea* as figured by Sars (Moll. Reg. Arct. Norv., t. 16, fig 1), but is proportionally a little wider anteriorly, and when immature has a peripheral angulation, not sharp but distinct enough to be readily observed. It differs from that species in (1) being more solid and strong; (2) having no transverse riblets anywhere, but a very fine close spiral striation on the early whorls; (3) having a firm smooth polished epidermis showing no lines of growth; (4) having a more regular, acute, and smaller apex, and less swollen apical whorls; (5) having the outer lip thickened, strengthened by a varicoid swelling, internally strongly lirate with six or eight raised liræ, the inner lip with a raised callus and nine or ten deeply incised grooves on the canal. The color of the deep-sea species is a little more pink and its appearance more elegant owing to the polished epidermis. It averages about the same size as the *C. rosacea.* The specimen figured is 8.0 mm. long and 3.5 mm. in maximum width. From *C. diaphana* Verrill, it differs in most of the above characters as well, but especially in being still broader in proportion. From a dwarf specimen of *C. Saintpairiana* the present form would differ by its less constricted canal, more regularly ovate whorls, less conspicuous varix, and especially by its less acute spire without traces of ribs anywhere. The very oblique edge of the columella is extended into a sharp plait, which appears to project like a tooth behind the columellar callus, and, being so far up, would at first sight be taken as unconnected with the pillar margin, which is masked by a false edge, in front, of labial callus.

Habitat. Station 2, off Morro Light, Havana in 805 fms., bottom temperature 39°.7 F. Also by the U. S. Fish Commission at Station 2601, thirty-six miles S. ½ W. from Cape Hatteras, North Carolina, in 107 fms., sandy bottom, temperature 67°.4 F.

Astyris Verrillii Dall.

Plate XIX. Fig. 8.

Columbella (*Astyris*) *Verrillii* Dall, Bull. M. C. Z., IX. p. 91, Sept. 26, 1881.
Columbella (*Pyrene*) *strix* Watson, Linn. Soc. Journ., XVI. p. 339, June 12, 1882; Challenger Gastr., p. 237, pl. xiii. fig. 2 a–d, 1885.

Habitat. Sculptured variety, Station 2, 805 fms.; Station 19, 310 fms.; Station 43, 339 fms.; Station 47, 331 fms. Figured variety, Station 43, 339 fms.; Station 47, 331 fms. Challenger Expedition, Stations 23, off Sombrero, in 450 fms., ooze; 24, off Culebra, in 390 fms., ooze; and 122, off Pernambuco, in 350 fms., red mud.

No more specimens have turned up. The specimen figured happens to be the smoothest of the lot; the more strongly sculptured specimens, taken by themselves and without the connecting links, would be thought by most naturalists to be distinct; the smooth ones have rounder whorls, a feature resulting mechanically from the absence of the ribs. For these reasons the name given by my friend Mr. Watson to the sculptured form would better be retained in a varietal sense. His variety *subacta* does not differ from his type more than many of my individuals differ from each other. The outer lip is immature or broken in both of the specimens he figures.

Astyris Saintpairiana Caillet.

Columbella Saint-Pairiana Caillet, Journ. de Conchyl., XII. p. 279, pl. ii. fig. 4, 1864.

Habitat. Station 247, off Grenada, in 170 fms., ooze; and Station 259, near by, in 159 fms., ooze, bottom temperature 53°.5 F. Marie-Galante, W. I., Caillet.

It is possible that this rare and pretty species may be a large, smooth form of *C. Lafresnayei* F. & B., described from the same locality in 1856. The latter differs chiefly in having the transverse ribbing continued on to the last whorl, and in somewhat smaller size. One of the Blake specimens of *C. Saintpairiana* in addition to the rosy tint shows pale yellow brown mottlings over the surface, strongest near the suture, recalling the coloration in pale specimens of *C. lunata* Say.

Astyris (lunata var.?) Duclosiana Orbigny.

Columbella (Astyris) Duclosiana Dall, Bull. M. C. Z., IX. p. 91, 1881.
Columbella Duclosiana Orb., Moll. Cuba, II. 136, pl. xxi. figs. 31–33, 1842.

Habitat. Station 20, 220 fms.; Sigsbee, off Havana, in 450 fms.

This pretty little species is closely related to *Astyris lunata* Say, of which it is with little doubt only a southern color-variety. The National Museum has it from Samana Bay, St. Domingo, and Tampa Bay, Florida, where it occurs abundantly. It has also been received from Barbados.

Subgenus ÆSOPUS Gould.

Æsopus Gould, Otia Conchologica, p. 138, Dec., 1860; type, *Æ. japonicus* Gould.

Little attention seems to have been paid to this peculiar and interesting group since it was described by Dr. Gould. Several species have been described that should be referred to it, beside *Æ. filosus* Angas which according to Tryon should not be referred to it, but this opinion I am not in a position to discuss for want of material. Beside the type which is now under my eyes, and was collected by Dr. Wm. Stimpson in Japan, there is a Californian species called *Amycla? chrysalloidea* by Dr. P. P. Carpenter, and also the species about to be referred to from the eastern coast of America.

Æsopus Stearnsii (Tryon) Dall.

Plate XXIX. Fig. 5.

Nitidella filosa Stearns, Proc. Phil. Acad. Nat. Sci., 1873, p. 345, figure. Not *Æsopus filosus* Angas, 1867.
? *Columbella peculiaris* Guppy, Geol. Mag., 1874, pl. xviii. fig. 20 (extra copies, p. 9).
Seminella Stearnsii Tryon, Man. Conch., V. p. 179, 1882.

This species was described from bleached specimens collected by Dr. Stearns at Tampa Bay, Florida..

Instead of being white, it is, when fresh, of a handsome warm brown, with an articulated presutural band of white and darker brown. Occasionally there are faint articulations of the color on the spiral riblets of the body whorl. The operculum is like the Japanese one. Beside those collected by Dr. Stearns in West Florida, it was obtained by the U. S. Fish Commission at Stations 2616, 2617, 2619, and 2622, in 15–17 fms., sand, off the North Carolina coast, and by Dr. Rush, in 12 fms., off Frying Pan Shoals.

Beside the above mentioned species, another, in which there is no spiral striation, has been collected at Samana Bay, St. Domingo, many years since, by Capt. J. P. Couthouy. This I have identified as *Terebra Metcalfei* of Reeve; it is of course not a *Terebra* at all, but belongs to the subgenus *Æsopus* of the *Columbellidæ*.

In taking leave of this family, I may observe that, though *Conidia ovulata* has not been taken nearer than the Bahamas, it is highly probable it will eventually be found in South Florida or among the Keys.

Family MURICIDÆ.

Subfamily MURICINÆ.

In variety of form and variability within the species-limit, probably no group of Gastropods surpasses the present family. Few have suffered more at the hands of the splitter-up of genera; the number of names proposed, in most cases without any reference to the rules of nomenclature or any investigation into the history of the species, is astonishing. I do not know a more discreditable exhibition of pseudo-science and very real mischief of this kind than that which may be found in the recent treatment of *Murex* and *Typhis* by certain authors, who, it is almost unnecessary to observe, have not been known to contribute anything of value to real biology, to atone for the unnecessary confusion they have created in biological nomenclature.

Fischer, Tryon, and the majority of those who have treated the modern genus *Murex*, have reduced the number of subgenera to six or seven, leaving the further subdivision into sections optional. The subgenera of *Murex*, as in all groups when sufficient material is studied, are found to fade into one another by moderate degrees. In studying the group it will be found, if the student is possessed of material enough and from a sufficiently wide geographical range, that the number of varices, while generally constant, is not an invariable character; that the same species has many and long, or few and short, spines within the range of its variation, and that the young of nearly related species, especially of the same faunal region, are often indistinguishable one species from another, while the adults present fairly tangible characters.

The Murices of the fauna we are considering may be arranged as follows.

Genus **MUREX** Linné.

Subgenus MUREX s. s.

This group has been badly handled in Tryon's Manual, the text of which indicates haste and insufficient material, while the figures are extremely poor and very badly colored. There is no doubt that Tryon was right in reducing the number of species, but a proper reduction can only be made by the exercise of great care and the thorough study of a large multitude of specimens. Without committing myself to the distinctness of all the species here included under this group, I can say that they appear to be distinguishable from the rather full material I have been able to examine.

Murex Beaui Fischer & Bernardi.

Murex Beaui F. & B., Journ. de Conchyl., V. p. 295, pl. viii. fig. 1, 1856.

Habitat. On the Florida Reefs, in 119 fms., Sigsbee; Station 300, at Barbados, in 82 fms.; Station 132, in 115 fms., rocky bottom, off Frederikstadt, Santa Cruz; Station 144, on the Saba Bank, in 21 fms.; Station 171, off Guadelupe, in 183 fms., bottom temperatures ranging from 55°.5 to 65°.0 F. Also at U. S. Fish Commission Stations 2134, south of Cuba, in 254 fms., sand (remarkably fine); and 2402, in 111 fms., mud, between the delta of the Mississippi River and Cedar Keys, Florida.

This fine and remarkable species was obtained in large numbers at Station 2402 of the Fish Commission. It is unquestionably a distinct form, though the very young are hardly to be distinguished from those of *M. nodatus* and *M. elegans.* The adult of the frilled or webbed variety in perfection is a magnificent shell. It is curious, however, that the webbing which is so remarkable a character is only found in specimens from deep, clean, and quiet waters. Those from muddy bottom, and all the young ones, show only traces of it, and in the adults there is often not even a trace of it, the varices being as rounded and spinous as if it never had a web. The most prominent and constant characters are the height of the spire, deep suture, and peculiarly rounded whorls.

Murex Cabritii Bernardi.

Murex Cabritii Bernardi, Journ. de Conchyl., VII. p. 301, pl. x. fig. 3, 1858.

Habitat. Off Sombrero, 50–72 fms.; Station 36, Gulf of Mexico, in 84 fms.; Station 132, off Santa Cruz, in 115 fms., rocky bottom; Station 143, off Saba Bank, in 150 fms.; Station 155, off Montserrat, in 88 fms.; Stations 253, 254, off Grenada, in 92–164 fms., coral; and Station 272, off Barbados, in 76 fms. Bottom temperatures 57° to 69° F.

This is a fine species, of which the adults are a fine uniform pink, or pinkish white, with no dots or other color markings whatever. They may be luxuriantly spinous, or nearly destitute of spines.

Magnificent specimens were dredged in 25 fms., in the Gulf of Mexico, in various places by the Fish Commission, and off shore it was found even as far north as Stations 2595 and 2604, in 34–63 fms., sand, 20–40 miles east and south from Cape Hatteras, North Carolina. *Murex Tryoni* Hidalgo, from the figure and description, seems to be a young specimen of this species.

Murex elegans Beck.

Murex elegans (Beck) Sowerby, Conch. Illustrations, fig. 84.

Habitat. Off Sombrero, in 54 fms.; Station 290, at Barbados, in 73 fms., coral, bottom temperature 71°.0 F.

This seems a strictly Antillean species with which *trilineatus* Reeve is synonymous, but which seems perfectly distinct from the genuine *recurvirostris*, which name has been made to cover a heterogeneous collection in Tryon's Manual.

Murex messorius (Sby.) Reeve.

Murex messorius Reeve, Conch. Icon. *Murex*, fig. 90, 1845 (not of Tryon).

Habitat. Station 142, Flannegan Passage, living in 27 fms., sand. Dead specimens at Station 220, off St. Lucia, in 116 fms., rocky bottom; Station 247, in 170 fms., ooze, off Grenada; bottom temperature 78° F., at the first station. In shallow water near the shore on the coast of Florida and the mainland round to Aspinwall.

This form is almost without spines, has one faint and two strong intervarical ribs, and has no color dots or lineations. It has a hispid epidermis, while that of *M. Cabritii*, its nearest relative, is smooth. The latter has a perfectly straight and much longer canal, unless it has met with some injury. The Florida specimens are often of a deep rose-pink. They are usually less hooked and spinose than the discolored specimen figured by Reeve, and have been well figured as *Murex Gundlachi* by Dunker.

Murex nodatus Reeve.

Murex nodatus Reeve, Conch. Icon. *Murex*, fig. 107, 1845.

Habitat. Station 132, off Santa Cruz, in 115 fms., rocky bottom; Station 142, Flannegan Passage, in 27 fms., sand; Station 155, off Montserrat, living, in 88 fms., bottom temperature 69°. F.; Station 272, off Barbados, in 76 fms., sand.

This is a solely Antillean species, so far as known. It is distinguished from the preceding as more light and spinose, by the more numerous inter-varical plicæ, the inter-nodular brown spiral lines, and a tendency to pale brown spiral zones. It is related to *M. elegans*, but from the material at hand appears to be distinct.

Murex Cailleti Petit.

Murex Cailleti Petit, Journ. de Conchyl., V. p. 87, pl. ii. figs. 1, 2, 1856.

Habitat. Off Santa Cruz, dead but fresh specimen, in 248 fms., sand, at Station 134.

I feel a good deal of doubt as to whether this is distinct from *recurvirostris*, but have not the material to determine the fact. It seems to differ in its longer canal, lighter texture of shell, more elaborate sculpture, and brown-spotted coloration. It is also rather more spinose.

Beside the above mentioned species of this subgenus the National Museum possesses, from the Antillean region, specimens of *Murex chrysostoma* Gray and *M. concinnus* Reeve.

Subgenus CHICOREUS Montfort.

The species figured to represent this genus, and which must determine its typical form in subdividing the group, is not the true *Murex ramosus* to which the text makes reference in Montfort's work, but a species related to *M. rufus*, *palmarosæ*, and *adustus*. Montfort doubtless would have included all the species like *pomum* and *brassica* in his *Chicoreus*, as would Swainson have done in his group named *Phyllonotus*; but as the latter figures a species of the *pomum* type as his example, if we divide the two series the name of *Phyllonotus* must be adopted for the latter, while *Muricanthus* stands only for the few species like *M. radix*, which possess a tooth or spine on the outer lip at the base of the aperture. Through such species as *M. quadrifrons*, etc., there is a gradual passage from *Chicoreus* to *Phyllonotus*, but for most purposes it will be convenient to retain the distinction.

Of the group comprehended under the name *Chicoreus*, the most prominent species of the region under consideration is *Murex rufus* of Lamarck, which has many synonyms, but in regard to which Mr. Tryon's manual is in hopeless confusion. It is, as far as plentiful material permits a judgment, perfectly distinct from *M. adustus*. It varies greatly in its frondosity. The most profuse, long, and subdivided processes are found in the variety *M. florifer* Reeve, which is found at Nassau, N. P. The typical form reaches as far north as within 25 miles of Cape Fear, N. C., where it is found in 15 fms., off shore, in the warmer water. It is abundant in Florida, the Keys, and the Bahamas. I have seen no Antillean specimens. *M. brevifrons* Lamarck has been found as far north as South Carolina, and is firmly established from Florida to Venezuela, and in the Antilles. A specimen of *M. quadrifrons* Lamarck, from the West Indies, is also in the National Museum. To this group, rather than to *Phyllonotus*, the following species may be also referred.

Chicoreus Hidalgoi Crosse.

Plate XVI. Fig. 3.

Murex Hidalgoi Crosse, Journ. de Conchyl., XVII. p. 408, 1869; XIX. p. 68, pl. i. fig. 4, 1871.

Habitat. Stations 155 and 158, off Montserrat, in 88 and 148 fms., sand, bottom temperature 64° to 69°.0 F.; Station 272, in 76 fms., off Barbados.

This is an extremely pretty and distinct species which seldom attains much more than an inch in length. It has been found in several places in the Lesser Antilles, and always in deep water.

Subgenus PHYLLONOTUS Swainson.

The most remarkable American species of this group is also rather northern in its distribution. *P. fulvescens* Sowerby* is in the National Museum from the coast of North Carolina and also from Texas. It grows to a large size and is the largest American species, but probably inhabits shallow water, as none of the off-shore dredgings show any specimens. I have not seen any specimens from the Antilles.

The second species of this group found on the shores of the United States is

Phyllonotus pomum Gmelin.

Plate XVI. Fig. 2.

Murex pomum Reeve, Conch. Icon., sp. 35; Gmelin, Syst. Nat., p. 3527, no. 6.
Murex oculatus Reeve, *op. cit.*, sp. 36, 1845.

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* Conch. Ill., p. 7, fig. 30, 1840. It was afterward published as *M. spinacosta* Val. (MS.) in Kiener, Icon. *Murex*, p. 49, pl. xli. fig. 1, 1843, which has been amended to *spinicostata*.

Murex mexicanus Petit, Journ. de Conchyl., III. p. 51, pl. ii. fig. 9, 1852.
Murex asperrimus Lam., Orbigny, Moll. Cuba, II. p. 158, 1853.
Murex pomiformis (Martini) Auctorum.
? *Murex imperialis* Tryon, *ex parte*.

Habitat. Station 152, Flannegan Passage, in 27 fms., sand, temperature 78° F., one very young specimen, which I have figured.

This species extends its range from the warm water off the coast of North Carolina to Florida, the mainland round to Venezuela, etc., and the Antilles. One of the brightest-colored specimens I have seen came from near Beaufort, N. C. The colors are variable, and I suspect the *Murex imperialis* from the island of Margarita, West Indies (if not an error for Margarita in the Gulf of California), referred to by Mr. Tryon, is merely a very large, pale, bright-mouthed *M. pomum.* The typical color of the mouth is pale salmon-color picked out with dark brown, but in some specimens the brown becomes a tolerably lively yellow, and the salmon-color a pale pink, while in still others the mouth is white, especially at inter-varical periods. The number of varices is usually three, but this is not invariable; there may be four, or the number may be irregular. The young shell sometimes looks like a little stumpy *Fusus*, of a vivid pink. Varices are inconspicuous in the early whorls, which are reticulated, while the nucleus is deep pink, or brown, smooth, small, and about two-whorled. The epidermis of the young shell is quite hispid.

Phyllonotus interserratus Sowerby.

Murex interserratus Sowerby, Thes. Conch. *Murex*, p. 39, no. 180, fig. 204, 1879.
Murex Pazi Sby., *op. cit.*, fig. 208, not of Crosse.

Habitat. Station 273, off Barbados, in 103 fms., coral; and Station 156, off Montserrat, in 88 fms., sand, bottom temperatures 60° to 69° F.

This is a very neat and pretty little species, which combines characters reminding one of *Ocinebra*, *Paziella*, *Trophon*, and *Phyllonotus*. No habitat was given for it by the describer, and it is now determined as Antillean for the first time.

Phyllonotus Pazi Crosse.

Plate XV. Fig. 1.

Murex Pazi Crosse, Journ. de Conchyl., XVII. p. 183, 1869; XVIII. p. 99, pl. i. fig. 7, 1870. Not of Sowerby, Thes. Conchyl. *Murex*, fig. 208, 1879.

Habitat. Station 20, off Bahia Honda, Cuba, in 220 fms., bottom temperature 62° F. Also at U. S. Fish Commission Station 2655, on the Little Bahama Bank, in 338 fms., sand, temperature 47°.5 F.

This is a remarkable little shell, which takes a long step toward uniting

Murex with *Trophon.* It has been called *Paziella* by one of those gentlemen who employ themselves in inventing superfluous names for these animals. He also called *Murex zelandicus* (which only differs from *M. Pazi* in wanting the spines on the canal) *Perrieria.* I do not know which name is prior, and neither of them are particularly worth retaining. Sowerby has figured what seems to be a specimen of *M. interserratus* for this shell. No figure of the genuine *M. Pazi* appears in the Thesaurus. The figure we give is of the young shell dredged by the Blake. A fine specimen, 32 by 32 mm., was afterward obtained from the Fish Commission. It differs from M. Crosse's figure only in wanting the revolving lines on the base of the last whorl.

Phyllonotus hystricinus Dall.

Plate XV. Fig. 4.

Shell yellowish white, thin, translucent when young, nine-whorled. Spire pointed, turrited; nucleus white, smooth; remainder of the whorls with close-set varices, crimped by the intersection of three principal posterior and several smaller anterior spiral ribs, the largest being the most posterior and angulating the whorls. The ribs are prolonged on the varices into guttered recurved spines, of which the posterior series is much the longest, the next pair smaller and subequal, those in front much smaller and more recurved; there are nine of these varices on the last whorl and more on the earlier whorls; with each varix a new canal is formed, much recurved, so that the base shows a vortex of four radiating canal spines with a deep chink in their midst. The canal remains always open; with this exception the margin of the aperture is continuous; it is elevated, a little thickened and with three or four nodular denticles in the adult within the outer lip. Max. lon. of shell, 21.0; of last whorl, 15.0; of aperture, 6.3; and of the canal, 8.5; max. lat. of aperture, 5.5; of shell, including spines, 16.5 mm.

Habitat. Station 158, in 148 fms., rocky bottom, off Montserrat; Station 206, off Martinique, living in 170 fms., sand, bottom temperature 49°.0 F.; also at U. S. Fish Commission Station 2134, south of Cuba, in 254 fms., sand.

This singular shell belongs to the group of *M. carduus* Broderip and *fimbriatus* Hinds (= *luculentus* Reeve). All of them might be or have been referred to *Trophon*, where I should have placed them, except that the operculum is typically *Muricoid* and the interior of the lip dentate. Multiply the series of spines and varices on *Murex Pazi* and you will have a shell of this kind, which is directly connected with *Trophon*, as far as shell characters go, by such species as *T. actinophorus.* But no linear arrangement can express the relationship of these groups or species.

Subgenus PTERONOTUS Swainson.

This group has been regarded as rather characteristic of the shores of the Southwestern Pacific Ocean, but we now have several species to add to the Atlantic fauna, where a few were already known.

Pteronotus macropterus Deshayes.

Murex macropterus Deshayes, Mag. de Zoöl., 1841, pl. xxxviii.
Pteropurpura macroptera Jousseaume, 1880. Fischer, Man., p. 641, 1884.

Habitat. U. S. Fish Commission Station 2595, 22 miles E. S. E. from Cape Hatteras, N. C., in 63 fms., sand, bottom temperature 75° F.

Two living specimens of the above species were obtained by the Albatross. The operculum is as figured by Deshayes in his original paper, the nucleus nearly lateral, but also nearly apical, as in *M. rufus* and *M. pomum*, though of course on a smaller scale. This species has had a generic or subgeneric name applied to it, but as for differential characters there are none alleged of a permanent and definite character.

Pteronotus phaneus n. s.

Shell ashy white, elongated, thin, six-whorled. Nucleus translucent, smooth, polished, of about one and a half whorls; whorls slightly convex, appressed to the suture behind them, connected by three continuous fin-like varices which in descending the spire make about half a revolution around it; these varices on the upper whorls were extended backward into a little wing-like point with dentate edges; on the last whorl the lines of growth indicate that the thin margin was rounded, parallel with the whorl. Transverse sculpture of fine growth-lines, and on the last two whorls at the periphery three short little narrow pinched-up riblets between the varices; spiral sculpture of fine rather faint striæ and wider undulations, hardly visible except on the varices; of these there are nine or ten on the last varix. Aperture elongate-oval, internally white, thickened, smooth; canal rather long, open, bent back. Max. lon. of shell, 17.0; of last whorl, 13.5; of aperture, 5.0; max. lat. of aperture, 3.0; of shell, 8.0 mm.

Habitat. U. S. Fish Commission Station 2662, off St. Augustine, Florida, in 434 fms., sand, temperature 43°.7 F.

This species agrees more nearly with the Indo-Pacific species by having three inter-varical ribs, while the Atlantic species hitherto known have only one. It is, however, more nearly related to the next species than to any hitherto described, as far as I have been able to ascertain. The body of the shell is not unlike that of *P. cordismei* Watson, figured in the Challenger Report, but the present species has none of the semitubular spines which give the Australian shell the look of a *Typhis*.

Pteronotus tristichus n. s.

Plate XV. Fig. 3.

Shell pure white, thin, polished, delicate, with six rather loosely coiled, rounded whorls; body more slender than in the last species, sutures much deeper and not appressed. Nucleus large, loosely coiled, glassy, white; varices making about one quarter of a revolution around the spire, very thin, edges dentate, prolonged on the shoulder of the whorls into a long pinna with a flat central rib; below there are three other less prominent ribs, which project at the edge of the varix on the last whorl; there is no transverse sculpture except incremental lines, nor any inter-varical ribs; the spiral sculpture is obscure and very faint, except the ribs on the varices; aperture small, pear-shaped; canal open, rather long, bent to the right, the canal belonging to the preceding varix, behind it, persistent and bent to the left. Max. lon. of shell, 15.5; of last whorl, 11.0; of aperture, 3.3; max. lat. of aperture, 2.0; of shell, 10.0 mm.

Habitat. Station 51, off Havana, in 243–450 fms., Sigsbee. Station 5, 152–229 fms., off Cuba.

This is a very elegant little shell, and not like any of the shallow-water species.

Genus EUPLEURA H. & A. Adams.

This genus, separated from the *Tritoniidæ* by Stimpson, with the type *Eupleura caudata* Say, is a *Pteronotus* with irregular and more numerous varices. It has been referred to *Trophon* as a subgenus by Kobelt, but, while admitting that some of the Trophons are more nearly related to *Eupleura* than to the type of *Trophon*, I think the dentate aperture and heavy primary varices, the texture and habits of the shell, the station occupied by the animal on the shores, and its subtropical preferences as to habitat, all point to a distinction worthy of preservation. I would, therefore, rather remove the muricoid Trophons, or rather the muricoid species which have been included with the real Trophons, to the vicinity of *Eupleura*, than sink the differences by a transfer in the opposite direction. I should not retain among the typical Trophons any of the species with a contracted callus and dentate aperture, or with varices of which part are distinguished from the others by a heavy deposit of shell substance.

Eupleura caudata Say.

Ranella caudata Say, Journ. Acad. Nat. Sci. Phila., II. p. 236, 1822.
Eupleura caudata Stimpson, Am. Journ. Conch., I. p. 58, pl. viii. fig. 5, 1865.

The range of this species, as exhibited by the specimens of the National Museum, extends from Cape Cod to Charlotte Harbor, Florida. The northern specimens are rather larger, rougher, with the longitudinal sculpture more equal to the transverse, and taking on in this way a more reticulated appearance. It has been confounded with a closely related, but quite distinguishable, West American species, *Eupleura muriciformis* Broderip, or *clathrata* Gray. The latter (A) is a considerably larger shell when adult, and may be distinguished from *E. caudata* (B) by the following characters.

A. Larger (*circa* 40.0 mm.); strongly three-noduled on the back of the last whorl, the middle nodule most prominent, giving the shell a trigonal aspect when viewed from the apex of the spire; a second primary varix frequently found behind this middle nodule, or near it; line of the nodules represented by a keel on the varix, which terminates in a strong recurved hook, grooved in front, with *no teeth behind this groove*, or between it and the body whorl, inside the aperture; aperture tapering gradually into the canal, and therefore ovate-pyriform.

B. Smaller (max. *circa* 28.0 mm.), with two strong or several obscure nodules on the back, all the varices nearly in the same plane, so that the shell is not trigonal but flattened-ovate viewed from the apex; the keel from the line of the nodules does not materially interrupt the rounding over of the varix to the body, though the young have a small spine here, which is not grooved in front, and *the denticulations of the aperture extend quite up to the body*, and there is even one on the callus overlaying the body whorl itself; the varices are broader, the mouth shorter and rounder, and more contracted at the beginning of the canal.

The comparison should be made in all cases with fully adult specimens; the young, and those specimens in which the callosity of the mouth is not fully complete, are very close to one another, especially if Floridian specimens are compared with those from the west coast of America. This is, however, only what we should anticipate with two forms which in all probability are descended from the same ancestors, and have become differentiated within a comparatively short geological time. The soft parts of *Eupleura caudata* are of a yellowish white color with opaque white dots and mottlings. The tentacula taper from base to tip, with the eyes about midway, not showing any enlargement. The foot is short, truncate in front, rounded behind. The verge is behind the right tentacle, turned back in a curve like the outline of the concha of the human ear. It is compressed at the base, thick, rounded and blunt at the tip, the transverse diameter subequal throughout. The egg capsules, like those of many *Muricidæ*, are pedunculate on a long slender pedicel, like a three-sided prism, swelling above, one keel rounding off and sending bifurcations to the other two, which are unequally prominent, the right or highest one terminating in a minute circular aperture, the left in an acute point. There are 12 to 20 very minute dark eggs in each capsule. They were taken by Dr. Stimpson at Beaufort, S. C. The wide difference between these and the flattened circular capsules of *Trophon* (see Jeffreys, Brit. Conch., IV. pl. viii. fig. 2) is apparent. The operculum is chestnut-brown, and like that of *Murex* or *Pteronotus*, not like that of *Trophon*.

Eupleura Stimpsonii n. s.

Shell small, thin, whitish, not polished, with four varices to the whorl and five whorls; nucleus smooth, white; spiral sculpture of extremely fine faint striæ, and of (on the last whorl) five low keels, most prominent on the back of the varices. The posterior keel is produced at the shoulder as a spine, which on the front side of the varix looks as if it were holding up the webbing of the varix as a tent-pole holds a tent; the other keels are represented on the front of the varix only by shallow grooves. The transverse sculpture is composed of well marked incremental lines; above the spine on the last whorl the web of the varix extends to the fifth preceding varix; below the spine it follows the outline of the aperture, nearly, and terminates midway down the canal; the margin is even except at the spine and the ends of the grooves; aperture rounded, continuously marginate except at the open narrow canal; there are four teeth inside the outer lip in front of the spine, and three near the front of the inner lip; the canal is slightly recurved, the end of the antecedent canal projecting from it at the left; suture well marked. Max. lon. of shell, 12.0; of last whorl, 9.0; of aperture, 3.0; of canal, 4.0; max. lat. of aperture, 2.2; of the varix at the spine, 2.8; of the shell, 7.0 mm.

Habitat. Barbados in 100 fms. A fragment in 1002 fms., off Cape San Antonio.

This is a very short and triangular little species, which was dredged alive; but the alcohol spoiled, and the soft parts and opercula were lost before I received the jar.

Genus TROPHON Montfort.

This genus has been very properly divided by Fischer and others into sections, sufficiently well characterized for the most part.*

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* In connection with this genus it may be as well to clear up the synonymy of a West Coast species which has fallen into confusion.

Trophon (Boreotrophon) Dalli Kobelt.

Trophon muriciformis Dall, Proc. Cal. Acad. Sci., VIII., extras, p. 4, March 19, 1877; Proc. U. S. Nat. Mus., IX. 302, pl. iv. fig. 6.

Trophon Dalli Kobelt, Mar. & Chemn., ed. Kuster, N. Ausg., t. lxxiv. fig. 1.

Trophon Goodridgei Forbes, MS. name on tablet in British Museum.

Trophon Gooderichii Sowerby, Thes. Conch., pl. ccccv. figs. 25, 26, 1880, as of Forbes; in error.

Trophon coronatus Sowerby, not of A. Adams.

Not *Trophon?* ("*Buccinum*") *muriciformis* King, Zoöl. Journ., V. p. 348, 1831.

Not *Eupleura* ("*Ranella*") *muriciformis* Broderip, P. Z. S. 1832, p. 179.

Not *Trophon muriciformis* Sowerby, Thes., sp. 38, pl. ccccv. fig. 40, 1880, wrongly as of Philippi (= *Fusus albidus* Phil. = *Trophon Gerversianus* Pallas, testa jun.).

The blunders of Mr. Sowerby in this connection are almost incredible. There is no *Trophon Gooderichii* Forbes, nor *T. muriciformis* Philippi. The *Buccinum muri-*

The deep-water species off the American coast would all appear to be referable to *Boreotrophon* Fischer, with the exception of one of the species about to be described. This presents in some respects such analogies with species of Murex like *M. hystricina*, that I have doubts as to whether the specimens I have seen are fully adult, and whether they might not, when more mature, develop an aperture of the muricoid type. For this reason I forbear to suggest any sectional name for the form in question until more data shall have been obtained.

The species known from the eastern coast (excluding the ordinary Arctic forms) are few. They comprise *T. vaginatus* C. & J. (+ *clavatus* Sars); *T. abyssorum* Verrill,* and the following species. All of them are closely related, and the range of variation is not yet well determined.

Boreotrophon (aculeatus WATSON var.?) lacunellus n. s.

Plate XV. Fig. 4.

Shell solid, white, turrited, with about eight whorls, carrying each twelve to fourteen slightly vaulted lamellæ, which are angulated on the smaller whorls at about the middle of their visible surface; nucleus smooth, white, with about one and a half turns; subsequent coils sculptured only by the stout lamellæ, moderately strong lines of growth, and rather numerous irregular scratches or ill-defined ridges directed in a spiral sense here and there on the shell. The angulation of the (aperture and consequently of the) varices, though distinct, is not sufficiently produced to form spines; suture distinct but not deep; posterior surface of the whorls oblique, here and there slightly concave; anterior surface (or base) rounded, produced and prolonged into a slender canal somewhat curved to the left; aperture narrow, long, rather sharply angulated at the suture, in front passing without any very marked constriction into the tapering canal; inner and outer lips reflected and connected over the body by a continuous callus; the inner lip has a chink behind it at the beginning of the beak; the outer portion of the reflection of the outer lip is angulated about one third of the way from the suture toward the beak; the lips are polished, white, and slightly thickened within. Max. lon. of shell, 41.0 (?); of last whorl, 29.0; of aperture, 24.5; lat. of shell, 15.5; of aperture, 7.5 mm.

Habitat. Station 163, off Guadelupe, in 769 fms., sand, bottom temperature 39°.75 F.

I am in some doubt in regard to this shell, which presents several differences from any of a number of closely allied forms, to none of which does it yet seem quite safe to refer it. It is larger and has a longer and more even spire, less angulated whorls, and angles much less produced, than in *T. multilamellosus* Philippi. It is nearer *T. clavatus* of Sars, but still with similar differences,

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ciformis King, which he tried to quote, is probably a variety of *T. Gerversianus;* but owing to the confusion and doubt attending the specific name, it is probably better to adopt that of Dr. Kobelt.

* *Trophon Lintoni* Verrill strongly suggests *Coralliophila* rather than *Trophon.*

and is three times as large as *T. clavatus*, with nearly the same number of whorls. It is most closely related to *T. aculeatus* Watson, from deep water off Pernambuco, and I am disposed to consider them the same, though our shell has fewer whorls in the same length and a proportionally longer canal. But the types of *T. aculeatus* are evidently quite young.

Younger specimens of what I suppose to be the same species have been taken by the U. S. Fish Commission at Stations 2677, 2678, off Cape Fear, N. C., in 478 and 731 fms., mud, bottom temperature 49°.3 and 38°. 7. Also in the Gulf of Mexico, at Station 2398, in 227 fms., mud, bottom temperature 48°.6 F.

Boreotrophon actinophorus n. s.

Plate XV. Fig. 2.

Shell translucent white, very thin, glassy, seven-whorled; nucleus white, smooth, two-whorled; spiral sculpture of very fine faint irregular spiral lines; transverse sculpture of the incremental lines and a keel or angulation at the shoulder of the whorl which is produced into long nearly horizontally extended triangular spines, deeply guttered out, and having the upper or posterior side shorter in the direction of rotation than the other, so that looked at from the apex the spines recall the paper whirligigs or wind-wheels used as children's toys. There are six of these spines on the last whorl and thirty-one on the whole shell figured. Spire elevated; suture distinct, not channelled; aperture narrow, long, angulated at the spine, continuous with the open canal which is curved to the right; at the left of the canal projects a whorl of three or more tips of antecedent canals (often broken away). Interior of aperture simple, not thickened. Max. lon. of shell, 17.5; of last whorl, 12.3; of aperture and canal, 10.0; max. lat. of aperture, 3.0; of the shell exclusive of spines, 6.0; of the whole shell, 14.0 mm.

Habitat. Station 134, off Santa Cruz, in 248 fms., sand; Station 206, off Martinique, in 170 fms., sand; and Station 299, near Barbados, in 140 fms., coral; temperatures from 49°.0 to 56°.5 F.

This is a very remarkable shell, and if immature, as I suspect, it is singular that an adult was not taken at one of the three stations. Whether a *Murex* or a *Trophon* it is entirely distinct from anything I have been able to find any record of. It has in all respects the appearance of a truly abyssal species.

Subgenus ASPELLA Mörch.

Aspella Mörch, Malak. Blätt., XXIV. p. 24, 1877. (No description.)
Poweria Monterosato, Nom. Gén. Conch. Medit., p. 113, 1884. Not *Poweria* Bonaparte, Ichthyology, 1841.
Murex, Triton, Ranella, etc., Auct. var.

The name suggested by Mörch for *Ranella anceps* Lamarck, was not accompanied by any diagnosis or differential characters. There is, however, no reason why it should not be retained, in the absence of any fully established name of other date. It is somewhat uncertain in the absence of definite information as to the nucleus of *A. anceps*, its operculum, dentition, and soft parts, to know whether it belongs to the group of which *Murex scalarioides* would form a type. But *A. anceps* presents so many analogies with *A. hastula*, especially as to form and quality of surface, while *A. hastula* has the nucleus and surface identical with and is otherwise so closely like certain forms of *A.? scalarioides*, that I do not think it judicious to separate them.

Aspella anceps Lamarck.

Ranella anceps Lamarck, An. s. Vert., VII. p. 154, 1822.
Ranella (Aspella) anceps Mörch, Malak. Blätt., XXIV. p. 24, 1877.
Ranella pyramidalis Broderip, P. Z. S. 1832, p. 194; Sowerby, Conch. Ill. *Ranella,* fig. 2.
Ranella producta Pease, P. Z. S. 1860, p. 397.

Habitat. St. Thomas, Riis and Mörch. West Indies, Tryon.

This species has been reported several times from the West Indies. It is doubtful, however, whether the shell referred to is really *T. anceps* or the following species. At least there is no reason why it should not be found in the Antilles, since I have seen specimens from Ceylon, Mauritius, Panama, Acapulco, and the Sandwich Islands.

The identity of Pease's shell with the ordinary *anceps* is determined from a specimen received from the author.

This shell is almost always found in collections dead and worn, with the secondary varices worn down, the calcareous layer which should clothe the surface eroded, and the nucleus lost. I have never been able to examine a perfectly fresh specimen. I have no doubt, however, of its distinctness from the next species.

Aspella hastula Reeve.

Ranella hastula Reeve, Conch. Icon. *Ranella,* fig. 42, 1844.

Habitat. China Seas, Stimpson. Station 2617, in 14 fms., sand, twenty-five miles S. E. from Cape Fear, North Carolina, U. S. Fish Commission.

This curious little species is of a chestnut-brown under the spongy calcareous layer. It has 3–5 varices to the whorl; *A. anceps,* always six. The revolving lines are less elevated than is usual with *A. anceps,* and never nodulated, as is often the case with the latter. The nucleus is exactly that of the following species, and the amount of compression varies very greatly, some specimens showing almost none.

Aspella? scalarioides BLAINVILLE (em.).

Murex scalaroides Blainville, Fauna Française, p. 131, pl. 5 a, figs. 5, 6, 1826; Monterosato, Bull. Soc. Mal. It., V. p. 227, 1879.
Murex scalarinus Bivona-Bernardi, Nuovo Gen. Moll., p. 27, pl. iii. fig. 11, 1832.
Murex distinctus Cristoforis e Jan, Cat. No. 4, pl. xi. fig. 2, 1833 (or later); Philippi, Moll. Sicil., I. p. 209, pl. xi. fig. 32, 1836; Reeve, Conch. Icon. *Murex*, fig. 161, 1845.
Murex leucoderma Scacchi, Cat. Conchyl. Reg. Nap., p. 12, fig. 16, 1836.
Ocinebra scalaroides Kobelt, Jahrb. Mal. Ges., IV. p. 244, 1877.
Murex (*Muricidea*) *scalarioides* Brugnone, Bull. Mal. Ital., III. p. 29, 1877.
Poweria scalarina Monterosato, Nom. Gen. Conch. Medit., p. 113, 1884.

Habitat. Mediterranean and Adriatic.

Aspella scalarioides var. paupercula C. B. ADAMS.

Murex pauperculus C. B. Adams, Contr. Conch., p. 60, 1850.
Triton Cantrainei Recluz, Journ. de Conchyl., IV. pp. 246, 418, pl. viii. fig. 10, 1853; and V. p. 156, 1856. Krebs, Cat., p. 21.
Ocinebra Cantrainei Kobelt, Jahrb. Mal. Ges., IV. p. 244, 1877.

Habitat. West Coast of Florida, in 50 fms.

Aspella scalarioides var. lamellosa DUNKER.

Ranella lamellosa Dunker, P. Z. S. 1862, p. 240.

Habitat. Florida Keys, Bermuda, Antilles.

Aspella scalarioides var. obeliscus A. ADAMS.

Murex obeliscus A. Adams, P. Z. S. 1851, p. 269; Sowerby, Thes. Conch. *Murex*, fig. 233, 1879.
Murex alveatus Reeve, Conch. Icon. *Murex*, figs. 157, 163, 1845.
? *Murex alveatus* Kiener, Icon. *Murex*, p. 24, pl. xlvi. fig. 2.

Habitat. St. Thomas, W. I., Adams; Vera Cruz, Mexico, Strebel.

The characters which I take to be of more than specific value in this polymorphic form are as follows: —

Nucleus small; at first obliquely and loosely wound, like a "stranded" rope, giving the appearance at first sight of a reversed nucleus; its material not different from that of which the rest of the early whorls are formed.

Shell with a tendency to lateral compression, as in *Gyrineum*, which may be more or less constant in the same species or vary during the ages of the same specimen.

Operculum elongated, acute, with an apical nucleus, resembling the operculum of *Sipho* or *Boreotrophon.* *Favartia*, which is nearest in form to this among the Murices, has a muricoid operculum with its nucleus not apical.

Dentition like that of typical *Murex*, not resembling *Muricidea*, *Ocinebra*, or *Trophon*.

Superficies of the shell with a cellulose or finely vermiculated cretaceous white layer; beneath this chalky layer a harder shell-substance, sometimes colored. Epidermis seemingly absent.

Canal short, recurved, always open; aperture denticulated in the adult.

The soft parts of a specimen of *A. scalarioides* var. *paupercula* Adams, taken at Key West by Hemphill, were white with very distinct black eyes. The tentacles were small and close together, the eyes situated on their outer sides half-way toward the tip. The foot is large for the size of the animal, rounded behind, double-edged in front, and auriculated at the anterior corners. As far as one could judge from the contracted alcoholic specimen, the auriculation must have been very marked and the anterior median indentation deep. The proboscis moderately long, the radula long but very small, its formula $1 + \frac{1}{3} + 1$. It much resembled that of *M. trunculus* and *M. brevispina* as figured by Troschel in his Gebiss der Schnecken. There were the usual two gills on the left side. The œsophagus was rather long, with no post-oral dilatation, and much contorted. There seemed to be a small appendix to the right margin of the siphonal extension of the mantle.

The shell of this species when quite young looks like a small inflated *Boreotrophon.* As it gets older, a tendency is often exhibited in two of the normal six varices to grow bigger than the others, beside which the intermediate part of the whorl actually becomes somewhat flattened. A specimen of this sort, especially if the flattening is pronounced, as it sometimes is, looks much like a large white *Aspella hastula*, and one such was described by Dunker as *Ranella lamellosa.* For this state or stage, sometimes permanent, I reserve the varietal name *lamellosa.*

Generally the second stage passes, later on, into what may be called the normal form, which is not flattened but muricoid or like a small *Tritonium.* This I call variety *paupercula*, as it is what was described as *Murex pauperculus* by Adams, and later as a *Triton* by Recluz.

This may be stout or slender, and is usually pure white. The slender form is apt to have the spiral lines stronger. When very long and with some touches of light brown on the under layer of the varices it becomes variety *obeliscus*, described as a species by A. Adams. This may be the same as *Murex alveatus* Kiener (if that is not a *Favartia*), and is certainly the shell figured under that name by Reeve.

The typical form is that from the Mediterranean, which, in a full series, I find to be generally more elevated, with rounder whorls, less prominent varices, and obscurer spirals. Still there are some Mediterranean specimens exactly like the Floridian variety *paupercula.* Blainville's specific name seems to be generally accepted, and I have used it, but have not been able to consult the original work. Monterosato adopts Bivona's specific name and separates the shell under a generic name which had been used for a fish some time previously by Bonaparte. For reasons already stated, I refer the species provisionally to *Aspella.*

Aspella hastula has exactly such a surface as this shell, and so when perfect does *A. anceps.* The nucleus of *A. hastula* is precisely that of *A. scalarioides.* I have not seen any specimen of *anceps* which retains the nucleus. But the more perfect the specimens, the nearer their general character agrees with that of *hastula* and *scalarioides*, though I admit that the commonly worn and defective beach specimens of *anceps* would usually convey a different impression.

Murex erosus Broderip has been compared with this species, and much resembles *M. intermedius* C. B. Adams. Both belong to the group which follows. It is destitute of an external cretaceous layer, and has a different operculum.

In the Jeffreys collection I find a "*Murex distinctus* var. *acanthopterus*," labelled by Monterosato. This shell is a young and slender whitish specimen of a *Muricidea*, like *M. hexagona.* I have not seen it referred to elsewhere, and the name may be a manuscript one.

Genus OCINEBRA Leach.

There does not seem to be any good reason why this name should be misspelled, as it is so often, and as I find it in the "Mollusques Marins du Roussillon," for example; but it probably arises from the fact that it is easier to look at Dr. Gray's P. Z. S. list of genera of 1847, than it is to correct the numerous errors contained in that list by going to the original authority.

There are several species on our coasts which belong to this group if we regard the shell only; but in *O. erinacea* the operculum is that of typical *Murex*, anterior but not apical, and somewhat laterally situated. In the American species the nucleus is apical, and I suppose them to bear somewhat such a relation to *Ocinebra* proper as *Boreotrophon* Fischer does to the typical *Trophon.* I have not been able to examine the operculum of *Murex breviculus* Sowerby, to which the name of *Favartia* was applied in 1880, according to Fischer.

But the shell of *M. breviculus* has so many points in common with that of our little Ocinebras, that I suspect it belongs to the same group, which would, in that case, form a subgenus of *Ocinebra* rather than of *Phyllonotus.*

For the present I shall adopt the name referred to for the shells in question.

Subgenus FAVARTIA Fischer.

Favartia cellulosa Conrad.

Plate XVI. Fig. 1.

Murex cellulosa Conrad, Proc. Phil. Acad. Nat. Sci., III. p. 25, 1846.
Murex nuceus Mörch, Cat. Kierulf, p. 14, no. 343, pl. i. fig. 9, 1850.
Ocenebra nuceus Mörch, Cat. Yoldi, p. 95, 1852.

Habitat. Coast of the United States from the vicinity of Cape Fear, N. C, to Florida, Vera Cruz, Bermuda, and the Antilles. Off Sombrero in 54 fms., Blake Expedition.

I found this form together with *Urosalpinx tampaënsis* and varieties of *U. cinereus* on the oyster-beds in Tampa Bay, exactly as described by Conrad nearly half a century ago. The Tampa specimens have spots of purplish brown inside the mouth, but most of the specimens from other localities have the mouth whitish with a brownish throat. It has been received from the Antilles under the name of *M. casta* A. Adams; it is probably the same as Sowerby's *M. jamaicensis*, which appears to be a young shell, and it is without doubt the shell whose varieties are catalogued by Melvill in his list of Florida shells under the names of *Murex tetragonus* and *cyclostomus*. The very slender and strongly recurved canal is almost always broken off in cabinet specimens.

Favartia (cellulosa var.?) levicula Dall.

This form differs from the typical *cellulosa* in being somewhat smaller and more slender, with one less varix on the average and with the varices thinner, somewhat more branched, and each forming a sharp-edged rather than a broadish rounded ridge. The revolving ribs are feebler, and in nearly all the specimens entirely obsolete over most of the space between the varices on the last whorl. This gives the shell a very different aspect, but a tendency to such a condition is seen in some specimens of *cellulosa* and other apparently allied species. I regard it as a variety of *cellulosa*, and Sowerby's figure (Thes. Murex, pl. xxiii. fig. 223) of his *jamaicensis* would fairly well represent a specimen in which the ribs had not become obsolete.

This form was obtained by the U. S. Fish Commission off Cape Lookout, N. C., at Station 2609, and in 25–40 fms. at various stations in the Gulf of Mexico, including Key West.

Favartia intermedia C. B. Adams.

Murex intermedius C. B. Adams, Contr. Conch. p. 60, 1850; not of Tryon.

This species is found from the Florida Keys to Vera Cruz, Mexico, is abundant at Bermuda (Hamlin), and has been received from Cuba and St. Thomas.

It is entirely distinct from the shell called *Triton Cantrainei* by Recluz and *M. pauperculus* by C. B. Adams. That species may be identical with *M. alveatus* Kiener, as claimed by Tryon, but he is wrong in referring the present species to it. It may be distinguished from *M. cellulosa* Con. by being more slender, elevated, and having in the adult the last varix proportionally larger thon any of the others. *M. pauperculus* C. B. Adams, which is in the National Museum from Vera Cruz and St. Thomas, is remarkable for having a sort of calcareous whitish outer coating, like that seen on *Ranella hastula* Reeve, which is easily removed, and under which the shell is often of a darker color.

Genus MURICIDEA (Swainson) Mörch.

< *Muricidea* Swainson, Malac., p. 296, 1840.
= *Muricidea* Mörch, Cat. Yoldi, p. 95, 1852.
= *Muricopsis* Bucquoy et Dautzenberg, Moll. Marins du Roussillon, p. 19, pl. i. figs. 5, 6, 1882; Fischer, Man., p. 642.

Swainson's genus contained a heterogeneous assembly After eliminating the forms which had already been separated from *Murex* by Montfort as *Trophon*, *Phos*, etc., there remained *M. hexagona* Lamarck and allied species to conserve Swainson's name. This revision was indicated by Mörch as above cited, who gives *M. hexagona* and *M. Blainvillei* Payr. as examples. This revision has been accepted by Carpenter and others without comment, but appears to have been overlooked by the authors of the Marine Mollusca of Roussillon, who in 1882 proposed the subgenus *Muricopsis* for the same two species. Numerous species which have been referred to *Pseudomurex*, etc., doubtless belong in this group, which is so intimately related to the genus *Murex* as to raise grave doubts as to its right to rank higher than a subgenus. The chief characters of the group are the absence of primary varices, or those, so characteristic of *Murex*, *Tritonium*, *Ranella*, etc., which dominate over the ordinary system of ribs; the operculum, like that of *Fusus* rather than *Murex*, with its apical or almost apical nucleus; the tallish spire, and the always open canal. Some species have only ribs; in the typical species there are spiny varices instead of ribs; in others again it is difficult to say whether the structure is a rib or a varix.

Muricidea hexagona Lamarck.

Fragments of this species were found in several of the dredgings. It is not rare on the Mexican coast and among the Antilles.

Muricidea floridana Conrad.

Urosalpinx floridanus Conrad, Am. Journ. Conch., V. p. 106, pl. xii. fig. 4, 1869.
? *Murex ostrearum* Conrad, Proc. Acad. Nat. Sci. Phil., III. p. 25, 1846.
Muricidea floridana Dall, Hemphill's Shells, p. 326, 1883.

This species is well named, as I have never seen a specimen except from Florida. I have little doubt, from all the circumstances, that this is *Murex ostrearum* of Conrad. Conrad's description was very short, loose, and insufficient for purposes of identification, so it is just as well to let it alone and retain the name about which no doubt exists. This species is very liable to be confounded with *Urosalpinx perrugatus* Conrad, which is found with it, among the oysters. That species is best distinguished by the longer, more sculptured, and less excavated shoulder to the whorl, the shorter and wider canal, and the purpuroid operculum. *M. floridana* has a totally different fusoid operculum with apical nucleus, as I showed in 1883.

Muricidea multangula Philippi.

Fusus multangulus Philippi, Zeitschr. für Mal., V. p. 25, 1849; Abbild. u. Beschr., III. p. 117, t. xxiv. 1, fig. 6, 1850.
Muricidea Hemphillii Dall, Hemphill's Shells, p. 327, 1883.

This fine species ranges from Cape Fear to Florida, Yucatan, and the West Indies. It varies greatly in color and often has a rich pink mouth. When in its highest state of perfection the epidermis is rendered hispid by little triangular projecting points. In most specimens, even when taken alive, the epidermis is smooth, the points having been rubbed off. There is a raised anterior edge to the pillar in the adult. The operculum is fusoid. I have not examined the dentition, but think it possible that its true place may perhaps be with *Fusus*, in spite of the short canal. It is one of our most elegant species.

Muricidea Philippiana n. s.

Shell short, acutely fusiform, solid, with about five whorls; spire acute, suture flexuous, appressed; slope of the spire nearly flat, the turns being flattened or even slightly excavated above the periphery; transverse sculpture of lines of growth, and of (on the last whorl nine) peripheral undulations or ribs with about equal interspaces; these are almost confined to the periphery; in one specimen these are crossed by three or four about equidistant spiral ridges, faint, becoming prominent and keeled or nodulous on the ribs; this one has also two strong ridges on the canal, and is pure white; another specimen has only faint spiral striæ on the canal, the periphery is smooth, the ribs lumpy, the color white with spiral brown lines toward the periphery; in still another the posterior row of nodulations becomes short, sharp, and spinous, the revolving threads seem more numerous on the base; canal short, rapidly tapering, open, pointed; a well marked siphonal fasciole is normal, one hardly shows it, another has it funicular; aperture elongate oval, outer lip with 5–7 strong liræ within; margin simple, acute; throat porcelain-white with a tendency to rosy or purple; columella smooth with a dash of rose or purple in some specimens, and two or three faint granulations, in the perfectly adult, near its anterior edge. Max. lon. of shell, 17.4; of last whorl, 12.4; of aperture, 10.0; max. lat. of aperture, 4.5; of shell, 10.5 mm.

Habitat. U. S. Fish Commission Stations 2362, 2363, off Cape Catoche, Yucatan, in 20–25 fms., coral sand; and by Hemphill at Key West, among coral at low water.

This is a singular shell, over which I have puzzled for some time. It has features recalling *Latirus, Tritonidea*, etc., but seems most fairly placed here. It is almost always overgrown with calcareous algæ; one has had this coat gnawed off by some vegetarian mollusk, the result of which is a pretty vermicular surface sculpture, which looks as if it might be natural. The most characteristic feature of the shell is the peculiar half translucent milk-and-water whiteness of its substance.

Genus UROSALPINX Stimpson.

This genus differs from *Muricidea* by its operculum, which is externally like that of typical *Murex* and internally shows gyratory *Purpura*-like scars. The nucleus is within the edge about midway between the ends, not apical or subapical as in the preceding group. In other respects they do not greatly differ. The genus is of economic importance, as it destroys millions of young oysters in all our seaboard States, holding the destructive eminence here which *Ocinebra erinacea* is accorded in Europe. There are three American species known to belong to it; *U. cinereus* Say, ranging from Massachusetts to Florida; *U. tampaënsis* Conrad, known only from the west coast of Florida, and which has been referred to *Eupleura* by Tryon; lastly *U. perrugatus* Conrad,* a species not included in Tryon's list, and of which the distinctive characters have already been referred to. It is also an inhabitant of West Florida from Cedar Keys to Key West.

Beside these shallow-water species, we have two species, described by Prof. Verrill, from 120–938 fms., off Hatteras, *U. carolinensis* and *U. macra* Verrill. There is some question as to the generic place of these shells, but, pending an examination of the soft parts, they seem as properly placed here as anywhere. The first mentioned, however, looks much like a *Muricidea* or short *Fusus*, closely related to *Fusus Pfeifferi* Philippi.

Genus TYPHIS Montfort.

This genus, founded by Montfort on a fossil species, is composed of a very compact little group of shells containing about a dozen recent and a few fossil species. These have accordingly been divided into twelve subdivisions by Jousseaume, to each of which he has applied a name, generic or subgeneric as the reader may prefer. It is perhaps no more than we should expect of a mind capable of laying such a performance before the scientific world, that he has selected invariably the most superficial and trivial specific characters upon which to base his subdivisions, and has missed entirely the only shell character in the whole group upon which a rational subdivision can be founded.

The authors who have monographed this genus have called attention to the fact that the tube which is the chief characteristic is sometimes situated between the varices and is sometimes continuous with them. A careful study of the surface of the shell shows that the fold of the mantle around which the tube is formed is, like the siphon, a fold, and not a continuous cylinder, although its edges are appressed so closely that the shelly secretion forms a perfect cylinder. It would seem that in the typical species of *Typhis*, as figured by Montfort, the tubes are wholly disengaged from the varices. In the recent species of this sort a continuous sutural line will be found to pass from the anterior side of the tube to the aperture, in the direction of rotation. Sometimes at the point where this line crosses the varix there is merely an angle, at others we find a hook or recurved even sigmoid spine, which, however, does not retain its originally excavated character. In species of the other type, like *T. arcuatus* Hinds, *T. duplicatus* Sowerby, *T. japonicus* A. Adams (very probably all varieties of a single species), *T. fistulosus* Brocchi, and the one about to be described, we find that the varix commences with and at the tube, though mostly developed beyond it, giving the completed shell the appearance of having had its tubes bent backward. Now in the common Mediterranean *T. tetrapterus* Bronn (+ *T. Sowerbyi* Auct.) a sinus was observed and is figured by A. Adams, though there are no permanent processes on the mantle-edge. It is absolutely certain, however, that at times when the shell is being secreted there must be a sinus in the mantle-edge analogous to that in *Drillia*, and the subtubular projection at the bottom of the sinus observable in many Drillias is analogous in its formation to the tube of *Typhis*. Both are doubtless avenues of escape for effete matter voided from the intestine. In *Typhis* of the typical section (like *T. tetrapterus*) there must be in the portion of the mantle which secretes this part of the shell an alternation of functions during the period of growth from one varix to another. In the other section (which may be called *Trubatsa*) there is only a resting time and a renewal of identical functions.

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* *Fusus perrugatus* Conrad, Am. Journ. Science, n. ser., II. p. 397, 1846. Collected at the Manatee River, West Florida.

It is of course true, that, in taking a general survey of the genus, certain somewhat intermediate species may be found; but this is what we must expect everywhere when we know all the species of any genus in their numerous variations. The worker who has the interest of science really at heart will in such cases avoid undue subdivision, either specific or generic; and when he finds that a division is advisable, he will give, not merely a few lines of description in more or less canine Latin, but a differential description showing, not only the characters on which he relies, but the way in which they differ from the characters exclusive to other groups, and to groups of less value, such as species. If all the specific characters were eliminated from his consideration, and he had been obliged to give differential diagnoses, it is likely that the author of the eleven unnecessary synonyms of *Typhis* would have paused, and probably thought better of it.

The length of both the tube proper and the tubular canal is greater when it is first formed than later. It seems to be soon dissolved by the water, or broken off. The last tube, until it is broken, is therefore always longer than the others. Specimens from the quiet abyssal waters occasionally preserve the tubes, or part of them, in a way to make this evident.

There is only one species of *Typhis* known in the recent state from the Antillean region. A species of *Murex* or *Eupleura* (*M. cancellata* Sby.) is reported by Krebs, and has been catalogued as a *Typhis* by Tryon. I doubt whether it can properly be referred to this genus. In 1849 Sowerby described a fine species, *T. alatus*, from the Miocene Tertiary of St. Domingo (Geol. Journal, VI. p. 48, pl. x. fig. 4), which is so much resembled by the *Typhis expansus* of the junior Sowerby, a recent species described without habitat in 1874, that I cannot help suspecting that they are the same, and that the species still exists in a living state among the Antilles, like many of the other Tertiary fossils. Both are very similar to the Mediterranean *tetrapterus*, and I have another species of the same type from the Pliocene Caloosahatchie beds of South Florida. It differs from the Haitian fossil in its more elongated form and narrower varix, and from the Mediterranean species in being much more acute anteriorly and destitute of the linguiform anterior varical expansion found in *T. tetrapterus.* In my report on the Caloosahatchie Pliocene it is named *T. floridanus.*

In the Thesaurus, the younger Sowerby describes this genus as trivaricose, and also in his continuation of the Conchologia Iconica. How inaccurate this is may be observed by any one who will examine a specimen. Whether there are any three-varixed species I do not know, as in the specific diagnoses of the monographs the number is not stated, but in all I have ever seen there were four varices in each whorl.

Typhis (Trubatsa) longicornis Dall.

Plate XV. Fig. 7. Plate XXXVIII. Fig. 5.

Typhis longicornis Dall, Agassiz, Three Cruises of the Blake, II. p. 70, fig. 294, 1888.

Shell translucent white when young, waxen with areas of pale rosy brown between the varices in the adult; varices four, ascending the spire nearly in a straight line; tubes tapering, recurved, usually broken off short, but originally long; nucleus subglobular, glassy, followed by seven gradually increasing whorls, obscured by the varices, but somewhat scalar behind; surface with extremely fine spiral striation, stronger lines of growth, and on the tips of the tubes and canals when fresh a glassy polish; varices not fimbriated, with rounded edges, strongly arched forward, subconcave behind; aperture small, subcircular, margin detached from the body, elevated, not sharp; with simple edge and smooth interior; canal long, slender, nearly straight, but bent back as a whole, with three antecedent canals surrounding a sort of umbilical chink. Operculum muricoid. Max. lon. of shell, 23.0; of last whorl, 19.0; of aperture, 4.0; of canal before the aperture, 11.5; max. lat. of aperture, 3.0; of shell, 10.0 mm.

Habitat. Off Havana, Sigsbee, in 127–400 fms., mud, bottom temperature 49°.5 to 55°.5 F.

This species is allied to *T. fistulosus* Brocchi, *T. arcuatus* Hinds, and the related forms above mentioned. It has wider varices than the former, and a proportionally smaller aperture; *T. fistulosus* appears to be destitute of the fine spiral striation, has a more distorted appearance, and does not reach so large a size. *T. longicornis* is much more fusiform, attenuated, and has longer tubes and canal than *T. arcuatus.* By the distribution of the species, the forms belonging to this section of the genus *Typhis* are found in all the northern oceans, apparently one species each in the Mediterranean, North Atlantic, Antilles, North Pacific, and China Sea.

SUBFAMILY PURPURINÆ.

The species of *Purpura* inhabiting the region under consideration are *P. patula* Linné, *P. deltoidea* Lamarck, and *P. hæmastoma* L., varieties *undata* Lam., *floridana* Conrad, and *trinidadensis* Guppy. They are all littoral species. There are, of the *Ricinula* group, *Sistrum nodulosum* C. B. Adams, *S. ferrugineum* Reeve, a beautiful variety of which has the spiral nodules small, elongated, and scarlet, while the rest of the surface is of a dark vernicose brown. The columella in this form is also of a fine red color, and it seems worthy of separation as a variety *rubidum*. *S. roseum* Reeve appears to derive its color from a crimson hydrozoön so common on West Indian shells. I should not refer it, if H. Cuming's identification be correct, to *Engina*, as Tryon does, though from the shell alone it is impossible to be certain. None of these forms were collected by the Blake.

SUBFAMILY CORALLIOPHILINÆ.

Genus **CORALLIOPHILA** H. & A. ADAMS.

Coralliophila H. & A. Adams, Gen. Rec. Moll., I. p. 135, 1853.
Pseudomurex Monterosato, Conch. Medit., p. 48, 1872 (name only); type, *Murex laceratus* Deshayes.
? *Latiaxis* Swainson, Man., p. 206, 1840. (*L. Maweæ* Gray.)

This genus should probably be called *Latiaxis*, as the type of Swainson is with little doubt only a specimen abnormally loosely coiled. It was regarded as abnormal by Gray, who described it. But I have not examined a specimen of *Latiaxis Maweæ*, and hence refrain from taking a step with regard to which there is still some doubt, though fortified by the opinion of Sowerby, Deshayes, Jeffreys, and Tryon.

The name of *Coralliophila* was illustrated by a large number of examples by the brothers Adams, but they selected no type.

However, as the *C. madreporarum* of Sowerby was not included in this list, and differs somewhat from the genuine typical species, it should not be taken as an example of the genus, as has been done by some excellent authorities. From this error probably has arisen the complication that the true *Coralliophila* has been renamed *Pseudomurex*, while a form which probably does not differ from *Rhizocheilus* except in living upon corals with large stems instead of gorgonians with small stems has been, in the latest manuals, cited as an example of *Coralliophora*. A good many species which have no natural relation to *Coralliophila* have been included with it in the monographs. This has added to the confusion.

There can be no doubt whatever, in the mind of any one who has examined a proper series of specimens with unprejudiced judgment, of the specific identity of certain typical Pseudomurices with certain typical Coralliophilæ. The operculum is identical, the shell characters shade indefinitely into one another from one specimen to another, the soft parts differ in nothing, the texture, character, color, and habitat of the shells are the same.

In considering such animals as are given to parasitism or commensalism, it is a truism that we must expect great variations of parts which in non-parasitic species would be of high systematic importance, and, secondly, great variation as between individual specimens of the species. Furthermore, if we have certain individuals of the species which take on a parasitic habit, and others which, whether voluntarily or perforce, do not, we shall find the nearest approach to the perfect norm of the species in the non-parasitic specimens.

Now, it is the writer's opinion that such forms as have been figured and described as *Latiaxis elegans*, *cariniferus*, and *Deburghiæ* in Sowerby's Thesaurus are merely the most perfect and luxuriant development of a species which, in its parasitic individuals, presents us with forms superficially very different, stunted, modified, or deteriorated. The operculum of *Coralliophila galea* of authors is precisely that of *Latiaxis Deburghiæ*, and of *Rhizocheilus madreporarum* of Sowerby. The loss of the operculum and other modifications exhibited by the type species of *Rhizocheilus* are exactly what we might expect in a species in which degeneration and specialization have proceeded very far from long continued parasitism. Still, I should expect to find an operculum in the free young of *R. antipathicus.* The form of the *Antipathes* upon which it lives is so slender that the shell must submit to greater changes in form than a species like *Coralliophila madreporarum*, which habitually rests upon a broad pillar of coral, or like *Coralliophila bracteata* (Brocchi) Tryon, which rarely does so, but is generally found free. Owing to these modifications, we may retain Steenstrup's name in a sectional sense, as it cannot (though of earlier date) be fairly applied to typical *Coralliophila.* In so variable a group, it goes without saying that the specific determinations are very difficult to make with confidence, and are here made with all reserves.

Coralliophila Deburghiæ Reeve.

Plate XVI. Fig. 5.

Latiaxis Deburghiæ Reeve, P. Z. S. 1857, pl. xxxviii. figs. 3, 6; Sby., Thes. Conch. *Latiaxis*, No. 2, fig. 5, 1882.

Habitat. Sigsbee, off Havana, in 80–119 fms.; Barbados, 100 fms.; Stations 164 and 166, off Guadelupe, in 150 fms., hard bottom, temperature 59°.75; Station 134, off Santa Cruz, in 248 fms., sand, bottom temperature 54°.5; Station 174, off Guadelupe (living), in 878 fms., bottom temperature 39°.75; Station 262, off Grenada, in 92 fms., sand, bottom temperature 62°; Station 292, off Barbados, in 56 fms., sand, bottom temperature 74°.5 F. Northward to Hatteras, U. S. Fish Commission.

The extraordinary range in depth and temperature which this animal sustains will be remarked. The largest and most foliaceous specimens are from the greatest depth. The specimen figured (max. lon. 20.0 mm.) is young, and has the expansions of the periphery much turned up. The older ones, which reach a length twice as great, or more, have the flat spines nearly horizontal. There may be ten or twelve of them on the last whorl. After careful comparisons, I conclude that, though it passes through a series of variations parallel to those of *C. bracteata*, it is sufficiently distinct from it to be easily recognized as different, when in good condition. It has the typical or spiny form, with flat expansions; another (var. *spinosa*) in which the spines are thorn-like and slender; a form (var. *fusiformis*) in which there are no spines, yet there are no trans-' verse ribs; and finally a form (var. *Lintoni* Verrill) in which numerous rounded transverse ribs of greater or less strength appear under the limose spiral ridges. The last was very naturally described as a *Trophon*. There may be between the above-mentioned varieties almost any graduation or interchange of characters, but usually the vigor which in one case expends itself in the formation of flat spines, in their absence is more or less devoted to the formation of transverse ribs.

Coralliophila bracteata Brocchi.

C. bracteata Tryon, Man., II. p. 210, pl. lxvi. figs. 378–380, 384, 386, 1880.

A specimen which seems to belong to this species as existing in the Jeffreys collection, and to be distinct from the preceding, was collected by the U. S. Fish Commission, in 17 fms., near Cape Fear, North Carolina; another at Key West, in 45 fms. The first belonged to the variety *C. lamellosa* Jan, the second to the variety *C. lacerata* Deshayes. The former was adult, the latter quite young.

Coralliophila galea Chemnitz.

Coralliophila galea Tryon, Man., p. 207, pl. lxv. figs. 362, 363, 364, 1880.
C. abbreviata Lam., *fide* Tryon.

Lamarck's name should probably take precedence, but I have not had time to devote to the synonymy.

This species has a nearly world-wide distribution in the tropics, and in our region extends throughout the Antilles and northward along the coast from Florida to Cape Hatteras. It is generally white, but specimens with a purple mouth are not rare in the Windward Islands. The young are known under many names, and generally are sharply keeled at the shoulder and shortly acutely conical at both ends, having a very different aspect from the rounded adults. The Fish Commission has dredged this species in 15–100 fms., living among coral. The shore specimens are carried there by Paguri; I do not know of a single specimen ever collected above low-water mark in a living state.

Coralliophila lactuca Dall.

Plate XVI. Fig. 6.

Shell white or grayish, short conic above, widely fasciolated at the anteriorly pointed base. Nucleus small, white, smooth; whorls eight, rather inflated, transverse sculpture of fine lines of growth, and nine or ten thin sharp-edged varices crisped by the spiral sculpture; the surface is generally shelly like that of *Boreotrophon*, but if the shell be absolutely perfect there is an external finely shagreened thin calcareous layer of an opaque creamy white, which is almost always eroded except in protected spots; spiral sculpture of six or more strong revolving primary ridges; other secondary ones to an irregular extent are found between the primaries; the posterior primary spiral forms a sort of shoulder to the whorl; suture undulating with the sculpture, obscure; base subconic, the young with a small, the adult with a large umbilical funnel, bounded by the prominent siphonal fasciole; aperture within white, smooth, rounded and continuous behind, acute in front, the anterior end being more like an angular gutter than a canal; margins irregular, corresponding probably with the asperities of its station on some coral. Max. lon. of shell, 21.0; of last whorl, 16.3; of aperture, 13.0; max. lat. of shell, 14.6 mm. The figured specimen is young, and measures 11.0 mm. in length.

Habitat. Station 5, Gulf of Mexico, off the shore of Cuba, in 152–229 fms., coral ooze, bottom temperature 49°.5; off Fernandina, Florida, at U. S. Fish Commission Station 2669, in 352 fms., sand, bottom temperature 43°.7 F.

This species differs by its surface from any of the previously mentioned species, or any others of the genus which I have examined. Its sculpture is more like that of the young *Magilus* than that of the other species. The figured specimen shows best the fresh sculpture and form of the young; an adult afterward received from the Fish Commission enables me to describe the mature shell. The soft parts were not obtained, but the specimens were perfectly fresh, and probably lived at the depth from which they were obtained.

I may add, on the authority of H. Cuming, that *Rhizocheilus madreporarum* Sby. is found in the West Indies.

Super-Family TÆNIOGLOSSA.

Family TRITONIIDÆ.

Genus DISTORTRIX Link.

Distortrix Link, Beschr. Rostock Samml., p. 122, May, 1807.
Persona Montfort, Conchyl., II. p. 603, 1810; type, *P. anus* L.
Distorta Perry, Conchology, pl. x., and expl. fig. 1, 2, 1811.
Distorsio Bolten, Cat. Con., p. 133, 1798, *pro parte;* ed. 1819, p. 94. (No descriptions or figures.)

This genus was first eliminated from all the other Linnean Murices by Link. Bolten's *Distorsio* was a pure catalogue name. and the species cited under it comprised Nassas, a *Tritonium*, etc., neither the genus nor the species being described or figured.

Link gives a proper diagnosis for the group, and cites, with references to figures, the two species, and only the two species, of which it is composed, even at the present day.

Distortrix reticulata Link.

Cassis vera, Distorsio reticulata, alba. Martini, II. p. 85, figs. 405, 406, 1771.
Buccinum reticulatum Humphrey, Mus. Calonnianum, p. 34, No. 620, 1797.
Murex anus L., Gmelin, Auctorum, *pro parte.*
Distorsio reticulata Bolten, *op. cit.*, p. 133, No. 1674. No description or figure. Ed. ii. p. 94, No. 1689, 1819.
Distorsio clatrata Bolten, *op. cit.*, No. 1675.
Distorta acuta Perry, Conch. Expl., pl. x. fig. 1, 1811.
Distortrix reticulata Link, *op. cit.*, p. 123, 1807.
Murex mulus Dillwyn, Cat. Sh., II. p. 704, No. 45, 1817.
Triton clathratum Lamarck, Enc. Meth., t. 413, fig. 4; An. s. Vert., IX. p. 186, 1822; ed. Deshayes, IX. p. 637, 1843.
Triton cancellinus Deshayes (non Roissy) in Lam., IX. p. 637, note, 1843; Reeve, Conch. Icon. *Triton*, pl. xii. fig. 45, 1844.
Distorsio cancellinus Tryon, Man., p. 35, III., 1881.
>*Distorsio clathrata* (Lam.) Mörch, Malak. Blätt., XXIV. p. 34.
<*Distorsio acuta* Perry (var.) *occidentalis* Mörch, *op. cit.*, 1877.

The name of this species has suffered from a slip of the memory by Deshayes, who stated in the note on p. 637, above referred to, that Roissy had named this species *cancellinus*. A glance at Roissy's work (Sonnini, Suites de Buffon, Hist. Nat. Moll., VI. p. 56, 1805) will show that this is an error. He describes his *Murex cancellinus*, and then goes on to say that it is "found fossil at Grignon," and that "according to M. Lamarck this *Murex* is the very remarkable analogue of the *grimace blanche* (our present species) which has been regarded as forming a variety of the *Murex anus* of Linnæus, but which forms a very distinct species, now living in the Southern Ocean." He gives a reference to Lamarck's figure of the Grignon fossil, and also a reference to Martini's figure of the recent shell, but, as the citation shows, did not confound them or name the latter. Reeve and others have followed this note of M. Deshayes, without referring to Roissy, and so this error has been perpetuated for nearly half a century!

Link merely followed Humphreys and Bolten in adopting the specific name of *reticulata*, suggested by Martini's phrase many years before. As both appropriate and ancient, it seems to have preponderating claims to be adopted.

The *Cassis* or *Cassida penita* of Meuschen in the Museum Gerversianium, which I have not been able to consult, is probably the oldest binomial* name for this species, if it really belongs to it. The doubtful citations of different authors would indicate, however, that Meuschen's name is not distinctive, and that he, like others before and since, confounded the two species of *Distortrix* with each other.

The specimens of *Distortrix* which I have seen from the West Indies, etc., when young, are clearly divisible into two series. The first form or variety, *clathrata*, is wider in the last whorl, more distorted, more pointed at the spire, with fewer transverse riblets, a decidedly longer and more oblique canal, and generally some brown or orange on the callus, which is more developed at the varical periods.

The second form, which may be named variety *reticulata*, is evenly cancellated, more regular in its shape, with a larger mouth, a smaller and always white callus, a shorter and straighter canal, and a more densely hispid epidermis. I have seen no adults that I could positively refer to this variety. Mörch separates two forms, but without explanation, and his synonymy does not bear him out. Still, it is possible that the forms he had in view were those I have discriminated.

The variety *reticulata* was dredged by the Blake at Station 157, in 120 fms., off Montserrat; Station 164, in 150 fms., hard bottom, near Guadelupe; Station 177, in 118 fms., sand, off Dominica; Station 262, in 92 fms., sand, off Grenada; and Station 282, in 154 fms., sand, near Barbados; bottom temperatures ranging from 56° to 65° F.

The variety *clathrata* seems to be more common, and was found at Station 164, above mentioned; at Station 247, in 170 fms., ooze, off Grenada; at Stations 273 and 300, near Barbados, in from 82 to 103 fms.; and by the U. S. Fish Commission at many stations off Hatteras, in 22 to 124 fms., in the Gulf of Mexico about Key West, and elsewhere, in water varying from 52° to 80° F. It has also been found and sent to the Museum from Tortola.

The nucleus is low and trochiform compared with that of many related forms. It is smooth and of rather horny consistency, and comprises about three turns. It might readily be taken for a little *Vitrinella* or *Adeorbis*, if detached.

Genus GYRINEUM Link.

Rana Humphrey, Cat. Calonn., p. 33, 1797, not of Linné. (No description or figure.) No type mentioned.

Bursa Bolten, Mus. Bolt., p. 128, 1798. (No description or figure.) Ed. ii. p. 91, 1819. No type mentioned.

Gyrineum Link, Beschr. Rostock Samml., p. 123, 1807. First species, *Murex rana* Linné (*spinosa* Reeve).

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* Since this was written I have seen a copy of the Museum Gerversianum at the British Museum, and to my astonishment find that it has no claims to be considered binomial, though it has often been cited for specific names.

Buffo Montfort, Conchyl., II. p. 575, 1810. (? Err. pro *Bufo?* Non *Bufo* Daud.) Type, *Ranella crumena* Lam. ?

Biplex Perry, Conch., Expl. pls. iv. and v., 1811. First species, *Biplex rosa* Perry (= *Ranella siphonata* Reeve).

Ranella Lamarck, Extrait d'un Cours, etc., 1812. Type, *Murex gyrinus* L.

Rejecting the *nomina nuda* of Humphrey and Bolten, as required by the rules of nomenclature, the first name applied to this group was that of Link, who gave a proper diagnosis, and included in his genus only species of *Ranella*, as they have been more commonly called. *Buffo* Montfort, *Biplex* Perry, and *Ranella* Lamarck, were subsequent, and synonymous. Perry's ill-constructed name has been retained in a sectional sense for the singular *B. perca*, which he included in his genus and was the first to describe. According to the rules of nomenclature, Lamarck's name must be entirely suppressed if the genus be regarded in the old sense. The species cited by him in his Extrait d'un Cours (p. 118, 1812) is, according to Gray, *Murex gyrinus* Linné. But the older authors confounded under this name half a dozen entirely distinct shells, and it is impossible to know which of them he had in view. If the Ranellas without a sutural canal be transferred, as has been done by Dr. Paul Fischer, to *Tritonium* as a subgenus, the *Ranella* of Lamarck would simply be a synonym of it. For this subgenus, in violation of all rules, *Argobuccinum* Klein has been widely adopted, though *Apollon* Montfort, recognized by Cuvier, will probably have to be accepted. It must be borne in mind, that Montfort's synonymy is not to be accepted without strict confirmation and comparison with his figures. His identification with Linnean names of the shells he figures is frequently wrong. What is certain is, that in 1810 he divided these shells (afterward combined under the name of *Ranella* by Lamarck) into two genera, *Buffo* comprising those with a sutural canal, and *Apollon* those without it. This amounted to a division of *Gyrineum* Link into two groups. But the name *Gyrineum* must be retained for one of these, as prior. *Buffo* is probably only a *lapsus* for *Bufo*, already in use for Batrachians at that date, so that, two groups being admitted, they would necessarily be *Gyrineum* and *Apollon*, both of which have numerous subsequent synonyms, including *Ranella* Lamarck, *Biplex* Perry, *Bufonaria* Schumacher, etc.

We are so destitute of exact information as to the soft parts, dentition, etc. of these animals, that it is not possible at present to arrive at a permanent settlement of the recognizable subdivisions.

I cannot help feeling that the wholesale transfer of the *Apollon* group to *Tritonium* is hardly justified as yet. There are, doubtless, some species which should be so eliminated; others will be associated with the *Muricidæ*, but the absolute identity in the opercula of numerous canaliferous and non-canaliferous species, the close similarity of sculpture, habit, and conchological characters, except the sutural canal, between various species of *Apollon* and *Gyrineum*, and the very slight difference which exists between a shallow sutural canal and the ordinary groove between the outer lip and the labial tubercle on the body whorl, as exemplified in various gradations by the several species, — all these reasons call for more thorough determination of all the facts to be considered for each species, before the transfer is fully adopted.

Tryon states, in his monograph of *Ranella*, that *Apollon gyrinus* Montfort is *Ranella gigantea* Linné, which is, of course, entirely inaccurate, as a glance at Montfort's figure is sufficient to prove.

The number of species actually inhabiting the Antillean region is disputed, and I have not the material to determine it. The sculpture and size are extremely variable.

Gyrineum affine Broderip var. cubanianum Orbigny.

Ranella affinis Broderip, P. Z. S. 1832, p. 179.

Habitat. Off Havana, Sigsbee, in 80–100 fms. (dead shells of the very young). Cuba, Arango, Orbigny. Arrowsmith Bank, Yucatan, and off Key West in 50 fms., coral, U. S. Fish Commission.

All the shells I have seen from the Antilles under the names of *Ranella cubaniana* Orb., *ponderosa* Reeve, *thomæ* Orb., *crassa* Desh., *granulata* Lam., *granifera* Lam., *Grayana* Dkr., *livida* Reeve, and *rhodostoma* Beck, have been referable to varieties, more or less pronounced, of *Gyrineum affine*, and are entirely indistinguishable from similar varieties brought from the Indo-Pacific region. I would not be understood as asserting that but one species is found in the West Indies, but, so far, I have seen no conchological evidence for more than one.

The larval shell of this species is extremely pretty, and worthy of description, since it is usually lost or eroded at an early period. It consists of a narrowly umbilicated naticoid shell of three and a half whorls. The nucleus is very small, smooth, and formed of half a whorl abruptly differentiated from the next stage, which has three spiral keels with the interstices beautifully decussated by elevated sharp oblique transverse lines. The keels gradually fade out, and the last whorl and a half are polished, with traces of the transverse sculpture. The whole is of a fine warm brown color, lighter toward the apex.

The numerous whorls and the indications of a regular growth in this larval shell, continued for the greater part of its coil, show that the larval period is prolonged. The well known ability of the floating larvæ to sustain themselves, like Pteropods, near the surface, and the length of time during which this may continue, afford a sufficient explanation of the world-wide distribution, in warm latitudes, of the species of this family. The young may easily be taken for adult shells, and the genus *Brugnonia* of Jeffreys, among others, has been referred to the larva of a mollusk of this sort.

The *Ranella anceps*, *hastula*, and their allies, do not belong in this genus.

March 18, 1889.

Genus TRITONIUM Link.

Tritonium Bolten, Mus. Bolt., p. 125, 1798; ed. ii. p. 88, 1819. (No descr.)
Tritonium Link, Beschr. Rostock Samml., p. 121, May, 1807. First species, *Murex tritonis* Linné.
Tritonium Cuvier, Règne Anim., II. p. 440, 1817. First species, *Murex tritonis* Linné.
Triton Montfort, Conchyl., II. p. 487, 1810; not of Linné, 1768 (Crust.), nor of Laurenti, 1768 (Batrachia).
Not *Tritonium* O. F. Müller, Prodr. Zool. Dan., p. 243, 1776.

The genus *Tritonium* of O. F. Müller was not a separation of incongruous material from a heterogeneous assembly and its discrimination apart, but the compounding out of genera already existing of a new heterogeneous combination about equivalent to the *Pectinibranchiata* as now understood. It fell deservedly, and the name was left unemployed. Though the second use of such names is not to be commended, and is by common consent at present abandoned, it would create immense confusion and difficulty if one were to apply such an *ex post facto* law impartially to the older writers. There is no good reason why we should not adopt the name proposed by Bolten, given a scientific standing by Link, and adopted by Cuvier.

The original group has been considerably divided; in fact, Bolten, Montfort, and others began the work of division. The whole matter is worth an exhaustive discussion for which the present paper does not afford the most appropriate opportunity.

Tritonium tritonis L. var. *nobilis* Conrad is found in this region, but was not collected by the Blake.

Subgenus COLUBRARIA Schumacher.

Colubraria Schum., Essai, p. 251, 1817. Fischer, Man., p. 654. Type, *Tritonium maculosum* Gmel.
Epidromus Mörch, Cat. Yoldi, p. 107, 1852.
Cumia Bivona-Bernardi, Nuovo Gen., 1838. Type, *Tritonium lanceolatum* Menke.

Colubraria lanceolata Menke.

Ranella lanceolata Menke, Synopsis, ed. i., p. 87, 1828 (excl. syn.). Mörch, Malak. Blätt., XXIV. p. 25, 1877.

Habitat. Off Sombrero, in 54 fms. Station 2596, of the U. S. Fish Commission, 17 miles E. S. E. from Cape Hatteras, N. C., in 49 fms., sand, bottom temperature 75°.0 F. Bahamas, Rawson; Antilles, Mörch; Vera Cruz, Mexico, Strebel.

Colubraria Swiftii TRYON.

Triton (*Epidromus*) *Swiftii* Tryon, Man., III. p. 31, pl. xvi. fig. 168, 1881.

Habitat. Station 272, in 76 fms., Barbados; also in 100 fms., off Barbados (fragment). Antigua, Swift; Samana Bay, Santo Domingo, Couthouy; Bahamas, Rawson; Bermuda, Goode.

There are also known from this region *Colubraria testacea* Mörch (*obscurus* Tryon pars); and *C. reticulatus* Blainville. Specimens of *C. eximius* Reeve, a Pacific species, have been distributed under the name of *Triton parvus* C. B. Adams, which is a *Phos,* so that Tryon has been led into the error of regarding Adams's species as a synonym of Reeve's, and assigning the latter to the West Indies, a habitat as yet not confirmed. It is not unlikely that *Triton lineolatus* Conrad (Phila. Proc., 1846, p. 26, pl. i. fig. 18) may have been a young specimen of *T. parvus*, but Conrad's figure and description are alike totally insufficient and unrecognizable, the type being lost, and the species should be dropped from the lists.

Subgenus RANULARIA SCHUMACHER.

Of this group *T. cynocephalus* Lamarck and *T. olearium* L., the latter reaching nearly to Hatteras, are known from the region, together with the following species.

Ranularia tuberosa LAMARCK.

Triton tuberosum Lam., An. s. Vert., VII. p. 185, 1822.
Triton antillarum Orbigny, Moll. Cuba, II. p. 161, pl. xxiii. fig. 20, 1847.
?*Triton pyriformis* Conrad, Journ. Acad. Nat. Sci. Phila., 2d ser., 1849.
Triton nodulus Mörch, Cat. Yoldi, p. 109, 1854.

Habitat. Florida, at Key West and Tortugas, Hemphill. Bermuda, Goode. Antilles, Orbigny. Vera Cruz, Strebel.

This, like several others, is found in the East Indies, and in spite of the efforts of various naturalists to separate it, I am quite in harmony with Mr. Tryon in his consolidation of the various synonyms. The several varieties are not geographically limited, and therefore cannot be regarded as anything more than varieties.

Subgenus LAMPUSIA SCHUMACHER.

Lampusia chlorostoma LAMARCK.

Triton chlorostomum Lam., An. s. Vert., VII. p. 185, 1822.
Triton pulchellus C. B. Adams, Centr. Conch., p. 60, 1850 (testa jun.).

Habitat. Off Sombrero, in 54 fms.; Station 142, Flannegan Passage, in 27 fms.; Stations 272 and 287, in 50–76 fms., Barbados. (Mostly young specimens.) Bermuda, Goode. Antilles and Mexican coast generally, Mörch.

Lampusia pileare LAMARCK.

Triton pileare Lamarck, An. s. Vert., VII. p. 182, 1822 (syn. excl.).
Murex costatus Born, *fide* Mörch, Malak. Blätt., XXIV. p. 28, 1877.
Triton americanum Orbigny, Moll. Cuba, II. p. 163, pl. xxiii. fig. 22, 1846.
Triton brasilianum Gould, Proc. Bost. Soc. Nat. Hist., III. p. 142, 1849.
Triton Martinianum Orbigny, Moll. Çuba, II. p. 162, 1847.
Triton Veliei Calkins, Proc. Davenport Acad. Sci., II. p. 235, pl. viii. figs. 1, 2, 1878 (ex typ.).

Habitat. Florida, Velie, Calkins. Antilles, Mexican coast, Bahamas, various collectors. Bermuda, Goode.

The *Murex pileare* of Linné was insufficiently described, and illustrated by erroneous references, as shown by Hanley. Consequently the name should stand as of Lamarck. Born's name is involved in doubt. The later synonyms are not doubtful. It is a very variable species, and suffers from wear on the beaches so as materially to change its appearance. Hence the numerous redescriptions under new names.

Lampusia gracile REEVE.

Plate XXIX. Fig. 2.

Triton gracile Reeve, Conch. Icon. *Triton*, fig. 58, 1845.

Habitat. Barbados, 100 fms. Cape Catoche, Yucatan, in 24 fms., U. S. Fish Commission. Aspinwall, Dall. St. Thomas, Riis.

I cannot agree with Mr. Tryon in referring this rather rare and elegant form to *T. vespaceus* Lamarck as a synonym.

Lampusia? pharcida DALL.

Plate XXXVI. Fig. 2.

Shell yellowish white touched or tinted with brown, aperture pure white; spire roughly three-sided, with four whorls and a four-whorled subcylindrical nucleus; nucleus smooth with rounded subequal whorls and a rather blunt apex; spiral sculpture of eight to ten subequal flattened riblets, with wider channelled interspaces and a larger thread on the periphery, five or six moderate threads on the canal, and occasional intercalary finer threads; four of the riblets are above the periphery; transverse sculpture of faint lines of growth, and stronger impressed lines which indent the spirals and give their own interspaces the effect of obscure ribs; beside these there are about three lumpy elevations between each pair of varices, the middle one largest; and every two thirds of a whorl a prominent rather flattened rounded varix, sculptured by the spirals and incremental lines, only moderately concave behind; aperture relatively small, ovate, lirate, and thickened all round; the outer lip with about six liræ, the largest posterior; suture deep, distinct; canal broad and hardly recurved, rather short; operculum? Epidermis polished, close fitting, and not hispid. Max. lon. of shell, 23.6; of nucleus, 2.7; of last whorl, 15.5; of aperture, 7.0; max. lat. of shell, 11.5; of aperture, 3.8 mm.

Habitat. Station 293, in 82 fms., sand, Barbados, bottom temperature 64°.5 F.

A shell with somewhat the general form of *T. gemmatum* Reeve, and a mouth and terminal varix recalling that of *T. Lœbbeckii* Lischke. It is less broad and short than the latter, and not nearly related to the former. I am unable to find in Tryon or elsewhere any closely related species described, and so am obliged to treat it as new.

Of other species of Tritoniidæ, *T. labiosus* Wood (+ *Loroisii* Petit) extends its range to within a few miles of Cape Hatteras. *T. vespaceus* Lam. and *T. rubecula* L. are more or less positively reported from the Antilles, while *T.* (*Lotorium*) *femorale* L. is found in Florida and southward. The presence of several other species is surmised.

FAMILY OÖCORITIDÆ.

Genus OÖCORYS FISCHER.

Oöcorys Fischer, Journ. de Conchyl., XXXI. p. 392, Oct., 1883.
Benthodolium Verrill, Trans. Conn. Acad., VI. p. 177, May, 1884.

? Section OÖCORYS s. s.

Columella simple, twisted, shell imperforate.

Oöcorys sulcata FISCHER.

O. sulcata Fischer, Journ. de Conchyl., XXXI. p. 392, Oct., 1883; Watson, Chall. Rep. Gast., p. 412, pl. xvii. figs. 11 a–c; Fischer, Man., p. 769, fig. 536, 1884.

Habitat. Station 173, off Guadelupe, in 734 fms., ooze, bottom temperature 40°.0; Station 227, off St. Vincent, in 573 fms., sand, bottom temperature 40°.5; Station 268, off Grenada, in 955 fms. ooze, bottom temperature 39°.5 F. Atlantic Ocean at great depths, Fischer, and Challenger Expedition.

In this singular mollusk we have another instance of the comparatively limited value of the form of the operculum, or even its presence. *Tritonium*, *Cassis*, *Dolium*, *Oöcorys*, are all nearly related, yet the operculum is absent in one group and in the others assumes most varied forms. By its dentition, its nucleus, and its thickened reflected lip and body callus, as well as its (occasional?) repetition of the varices, it approaches *Cassis* more nearly than *Dolium*, and perhaps such species as *Tritonium* (*Linatella*) *Poulsenii* Mörch, of which the operculum is unknown, more nearly than either.

In one of the Blake specimens there are two distinct varices about a quarter of a whorl apart. The lip and body are pretty well thickened, and the faint reflection of the outer sculpture in the callus within the outer lip is perceptible. There is a presutural band caused by the failure of one or two spiral ridges in that region, leaving a flattish space. There is no umbilicus nor fasciole in any sense. The nucleus is very minute, and does not differ in texture from the succeeding whorls. Our shells agree well with Fischer's figure and that given by Watson, but are evidently older and have a more prominent reflected lip and callous surface around the mouth. They have six whorls, and are 37–38.5 mm. long, and 28.0 wide, of which 31.5 to 32.5 mm. are comprised in the length of the last whorl. None retained the soft parts, but larger specimens were obtained of this or the next form by Prof. Verrill.

I have not seen the *Anura Craveni* referred to in this connection by Fischer, but the name *Anura* has long been in use in another sense among *Vertebrata* and cannot be properly used at all in the nomenclature of Mollusks. I doubt very much if the genus *Anura* has any relation to the present form.

? Section BENTHODOLIUM.

Columella with a groove behind it, forming, with the callus, a narrow but deep and pervious umbilicus, and distinct siphonal fasciole.

Oöcorys abyssorum (V. & S.?) Dall.

Benthodolium abyssorum Verrill & Smith, Trans. Conn. Acad., VI. p. 177 (*pro parte ?* excl. figures), 1884.

Habitat. U. S. Fish Commission Stations 2400, in 169 fms., mud, in the northern part of the Gulf of Mexico; and 2676, 2677, and 2678, in 407–731 fms., mud and ooze, off the Carolina coast, bottom temperature 38° to 46° F.

This shell is amazingly like *O. sulcata*, except that the spire tends to be a little more elevated, the callus of the lips and the shell in general seem heavier, and behind the columella is a well-marked groove about a millimeter wide bounded externally by a siphonal fasciole, very distinct in the young and partly obscured by callus upon it in the adult. The umbilicus is about the size of the "lead" of a pencil, a bristle will penetrate nearly to the apex of the shell. It is possible that the callus on the columella may in some extremely old specimens extend over and close this umbilicus, but in *O. sulcata* there is absolutely nothing of the kind in old or young. I can hardly conceive that a single species can vary to the extent of having such differences as separate this from the latter. Although in his description of *Benthodolium* Prof. Verrill says, "not umbilicated," yet in his specific description, speaking of the callus on the columella, he says, "turning outward so as to nearly conceal a narrow umbilical chink." This leads me to think that both species may have been represented in his material, and while he figured one he described the other. At all events, it can do no harm to retain the name in the manner I have done until more extensive material can be studied, and in this way prevent the distinction from being lost sight of.

One young specimen measures 39 by 25.5 mm., but the outer lip is not perfect. An adult measures 37.5 by 27.0 mm., the last whorl being 30.0 mm. long. The soft parts were lost from all the specimens. The nucleus was as in *O. sulcata*, and there were six whorls. In all respects not noted, the shell was extremely like *O. sulcata*. The outer lip was obscurely lirate, or rippled, within.

I am uncertain whether the following group should be referred to this family, or to the vicinity of *Liomesus*.

DALIUM n. g.

Shell solid, spirally sculptured, short-fusiform, with an unexpanded aperture, outer lip thickened, simple; body whorl smooth with a well marked smooth callus; nucleus not differentiated; pillar twisted, simple, shorter than the aperture; canal short, obliquely truncate, nearly straight, not deeply notched.

This shell recalls *Dolium* or *Sconsia* in its sculpture and texture, but is heavy and solid, has a much more produced spire, and a different outer lip and columella; it is perhaps most like *Lagena*, but without plaits on the pillar, liræ, or teeth on the outer lip; its relations are probably in this direction, or with *Liomesus*. It bears some resemblance to *Liomesus*, especially to such forms as *L. canaliculatus* Dall, but the unexpanded aperture, the marginated suture, the facies of the shell, and its habitat are rather against this allocation. In the absence of the soft parts and operculum its systematic position cannot be determined. The type is

Dalium solidum n. s.

Plate XIX. Fig. 10 d.

Shell heavy, solid, porcellanous, six-whorled, with a rather obtusely pointed spire; suture inconspicuous, marginated by the sculpture, slightly channelled; nucleus minute, smooth; shell sculpture consisting, first, of transverse rugæ, due almost wholly to irregularities of growth and evanescent or absent on the nucleus; secondly, of spiral ridges with channelled interspaces, of which four narrow ridges with about equal interspaces are found immediately in front of the sutural margin; these are separated from a single narrow thread in front of them by a broad shallow channel about equal in width to two of the preceding narrow ridges and their attendant interspaces; before these again lie (on the last whorl) about twenty-five broad flat-topped ridges separated by channels of less than half their width, the whole very uniform, though as usual a little coarser near and on the pillar; aperture rather small, attenuated anteriorly, pointed behind, with a short, wide, nearly straight canal in front; outer lip slightly thickened inside, smooth, simple except for vague indications of the external sculpture in the less mature state; body with a smooth evenly spread callus extending considerably in advance of the aperture and over the inner half of the pillar; the latter perfectly smooth, evenly twisted (the siphonal fasciole distinct, not prominent), with the anterior end obliquely truncate or falling away roundly into the short canal. The nucleus is filled in the specimens examined with a solid mass of shelly matter, the epidermis, if any, is extremely thin, and there seems to be a tendency to erosion of the thin outer more calcareous layer, as in *Buccinum.* Lon. of shell, 41.25; of aperture, 25.00; max. lat. of shell, 23.00; of aperture, 10.00 mm.

Habitat. Off Grenada, Station 265, in 576 fms., bottom temperature 39°.7 F. Bottom of gray ooze.

The specimens of this singular shell were fresh, but without the soft parts. The ante-sutural band at first sight suggests a pleurotomoid notch, but a careful inspection shows that there are no grounds for this suspicion, as the lines of growth cross the band without the slightest sinuosity.

The habit of the shell is very different from that of *Oöcorys*, which in outline and spiral sculpture somewhat resembles *Dalium*, and the present species can best be compared to a compact, solid, simple *Sconsia* (Gray), with a plain unsculptured columella, unreflexed lip, and elevated spire without varices.

FAMILY CASSIDIDÆ.

Genus CASSIS LAMARCK.

Without going into the synonymy of those shells ordinarily referred to this genus, *C. cameo* Stimpson and *tuberosa* Linné reach the southern coast of the United States, and perhaps as far north as Beaufort, N. C.; *C. flammea* L. reaches the Florida Keys; *C. testiculus* L., and *C. inflata* Shaw (with many synonyms) and its very distinct-looking smooth variety, are found on the Florida coast; the variety and both the typical forms go northward to within a few miles of Hatteras, in 15–125 fms. The young of *C. inflata*, which is a remarkably pretty little shell, was dredged by the Blake in 54 fms., near Sombrero, W. I. Lastly, *Galeodea Coronadoi* Crosse, of which a single specimen has hitherto been known, from Matanzas, Cuba, has been dredged by the U. S. Fish Commission at Station 2603, in 124 fms., sand and gravel, forty miles from Cape Fear, N. C. *Oniscia*, or, more properly, *Lambidium oniscus* L., has not yet turned up from north of the West Indies. *L. strombiformis* Reeve I have never seen, but the beautiful *Oniscidia Dennisoni* of Reeve was dredged in 130 fms., coral, on the Arrowsmith Bank, Yucatan, by the U. S. Fish Commission.

I am quite convinced that some startling modifications of nomenclature and ideas respecting what constitutes a species of *Cassis* will follow a study of a sufficient number of specimens of the three larger species above mentioned.

Finally, what appears to be an undoubted specimen of *Sconsia striata* Lamarck has been dredged by the U. S. Fish Commission at Station 2646, in 85 fms., sand, off Cape Florida. I have exactly the same shell from the East Indies, where it was collected by the Wilkes Exploring Expedition, and it is very doubtful if there is more than one species yet known, those which have been named seeming to differ but varietally. Like other shells of this family, the adults differ very widely in their size at maturity, having a range in this respect fully equal to that of the various species of *Cypræa*.

FAMILY DOLIIDÆ.

It is probable that this should form only a subfamily under *Cassididæ*, but it is better to await fuller knowledge of all the forms before taking decisive action.

Genus DOLIUM LAMARCK.

Dolium galea L. and *D. perdix* L. extend their range northward to Florida, and the former has even been reported from Beaufort, N. C. It has several synonyms, especially *D. antillarum* Mörch, which does not differ from the type. *D. perdix* is widely known under the names of *pennatum* Martini and *plumatum* Green, while its greenish yellow horny larval shell was described as *Helix sulfurea* by Prof. C. B. Adams.

Subgenus EUDOLIUM DALL.

Doliopsis Monterosato, *non* Conrad.

Eudolium Crosseanum MONTEROSATO.

Plate XV. Fig. 5.

D. Crosseanum Allery de Monterosato, Journ. de Conchyl., XVII. p. 228, pl. xii. fig. 1, 1869.

D. Bairdii Verrill & Smith, Am. Journ. Sci., XXII. p. 296, Oct. 1881. Trans. Conn. Acad., V. p. 515, VI. p. 253, pl. xxix. figs. 2 a–b, 1884.

Habitat. Station 192, off Dominica, in 138 fms., sand. Station 291, off Barbados, in 200 fms., stony bottom, temperature 49°.7 F. Off Havana, in 292 fms. Northward to Martha's Vineyard, in 89–234 fms., Verrill. Deep water off Palermo, Italy, Monterosato.

A living specimen taken off Delaware Bay by Captain Tanner might have served as a model for the figure in the Journal de Conchyliologie. But most of the specimens I have seen from the Antilles, dredged by the Fish Commission, are smaller, though adult. There is a tendency for the primary spirals to be darker brown, and even articulated with dark and light brown. The nucleus is very large, olive greenish, but in the adult lined with white shelly matter, which, when the horny larval shell is peeled off, as often happens, reproduces it in polished white shell substance. The spirals are usually prettily crenulated by lines of growth. They vary in number and relative size. The suture is sometimes more, sometimes less clearly defined by the meeting of the whorls. It is not channelled. The callus of the outer lip varies from pure white to livid rose-color. It is strongly lirate, reflected, and thickened. The canal is very shallow. In the adult a more or less thickened callus extends from the posterior commissure to the canal, somewhat irregularly distributed, and except on the keel of the pillar (where it is a little tubercular) reproduces in its elevated ridges the sculpture of the surface under it. This callus on the body agrees with the notches on the rhachidian tooth in indicating a relationship with *Cassis* nearer than that exhibited by most of the genus. For it Monterosato proposed a section *Doliopsis*, a name preoccupied by Conrad, but there would seem to be good grounds here for a sectional or subgeneric subdivision.

Eudolium Verrillii n. s.

Plate XXXV. Fig. 12.

Shell resembling *D. Crosseanum*, and best described by comparison with a specimen of the latter of equal size.

D. Verrillii is sculptured with strong revolving ribs without the finer intercalary thread of *D. Crosseanum*. At the beginning of the last whorl there are five ribs between the sutures in *D. Verrillii*, and eight primary ribs in the same place in *D. Crosseanum*. The nucleus in *D. Verrillii* has no trace of the horny larval shell characteristic of the genus, but it may have been decorticated after having been filled with shelly matter. The spire ascends more evenly in *D. Verrillii*, and the suture is deeply channelled. There are nineteen ribs at the end of the last whorl, of which five are above the periphery. The ribs are coarsest near the suture and decrease gradually forward. Behind the very broad thick and strong lip is a deep sulcation. Inside, the outer lip is much reflected and has about sixteen coarse crenulations. On the body and pillar is a thick callus deeply grooved and much thickened on the body, and almost making tubular the posterior commissure. On the pillar the callus is vermiculate. The pillar is formed like that of *D. Crosseanum*, but shorter and with the callus arched like *Oöcorys*. The outer surface of the specimen has the grayish white of a " dead " shell, and the surface has lost its polish. It has, however, a transverse sculpture granulating the spirals and reticulating the channels, like the sculpture on the shoulder of specimens of *Cassis inflata* Shaw. It has five whorls, the last being rounder than in *D. Crosseanum*, and all very thick and solid. Max. alt. of the shell, 32.0; of last whorl, 27.0; of aperture, 22.0; max. lat. of shell, 24.3 mm.

Habitat. U. S. Fish Commission Station 2120, in 73 fms., mud, near Grenada, bottom temperature 67°.0 F.

This shell is easily distinguished from *Oöcorys* by its callus and broad lirate outer lip with a sulcation behind it, as well as by its coarser more *Cassis*-like sculpture. Only one dead specimen was obtained.

FAMILY AMPHIPERASIDÆ.

Genus AMPHIPERAS GRONOVIUS.

Subgenus SIMNIA RISSO.

Simnia Risso (Leach MS.), Hist. Nat., IV. p. 235, 1826.

This genus was not proposed on the character of a sharp outer lip, as stated by Tryon and others. In fact Risso's figure of his type species shows the smooth narrow thickening of the lip exactly as it occurs. It was rather the general form of the shell, elongate and without the thick and dentate peritreme characteristic of *Ovula carnea* Risso and related species.

In a valuable paper in the American Journal of Conchology (VI. p. 183) Prof. Theodore Gill has treated of the relations of *Amphiperasidæ.* Here he characterizes the group as having a shell simply rolled upon itself and thus not spiral; and in this respect he associates with them the genus *Pedicularia.* Now I have already shown, and elsewhere figured in this paper, the young spiral shell of *Pedicularia,* and a happy accident has enabled me to discover that the young (not embryonic) shell of *Simnia* (*Neosimnia*) *uniplicata* Sby. is also spiral, and so continues for some four whorls before putting on the involved roll of the adult. Of course Prof. Gill's merit in discriminating the distinction between the enrolment of the adult *Amphiperas* and *Cypræa,* which had been overlooked by conchologists, is not affected by this discovery, and he expressly excluded the embryonic shells from his generalization, as they were at that time unknown.

I suspect that the type of *Radius* Montfort will be found to differ from the *Simnia* group, otherwise the name *Radius* has priority. *Neosimnia* Fischer forms a convenient section of *Simnia,* but the distinction between the two is very slight in some species, and it sometimes happens that one might easily assign the same species to one or the other according to the stage of growth which it has attained.

There is no reason to think that the genus *Rhizorus* Montfort has anything to do with *Simnia,* as claimed by Mörch.

Simnia acicularis LAMARCK.

Ovula acicularis Lam., Ann. du Mus., XVI. p. 112, No. 9; Anim. s. Vert., VII. p. 369, 1822; ed. Desh., X. p. 472.

Ovulum aciculare Sowerby, Thes. Conch. *Ovulum,* No. 31, p. 477, pl. c. figs. 43–46, 1848; Reeve, Conch. Icon. *Ovulum,* pl. xii. figs. 53 a, 53 b, May, 1865.

Habitat. Brazil and South Carolina, Sby. Florida, Hemphill. North and South Carolina, Kurtz & Stimpson. Sigsbee, off Havana, in 80 fms., and off Sombrero, in 70 fms. Twenty-five miles off Cape Fear, North Carolina, U. S. Fish Commission, at Station 2619, in 15 fms., sand.

Simnia piragua n. s.

Shell remarkably slender, narrow and long, tapering regularly toward the posterior end from a point about one third of the whole length behind the anterior end. Viewed from above the left profile is gently arched like a bow, on the right there is a shallow emargination behind the end of the canal, and the rest of the right-hand profile is almost in a straight line. The back is pale coffee-brown, the tips and slightly thickened margin white. Below, the aperture is seen to be very narrow except for a short space anteriorly, behind the above mentioned emargination. There is a slight callus on the body; the columella, if it may be so called, is tinged with rose-pink. Both ends of the shell are slightly recurved; the surface is marked only by lines of growth and a very few faint spiral striæ toward the ends. The extreme anterior end of the canal is sharp-edged, the rest is thickened but not reflected. Max. lon. of shell, 23.0; max. lat. of shell (7.0 mm. back from anterior end of canal), 3.0; max. lat. of body, 2.6; of aperture, 1.6 mm.

Habitat. Living on Gorgonian coral, in 23 fms. water, at U. S. Fish Commission Station 2138, between Jamaica and Hayti.

The soft parts appear in the dried animal to have been nearly black.

This is the most slender and evenly tapered species known, though not very large. The nearest to it is *S. lanceolata* Sowerby, from Luzon, and *S. piragua* is much more slender, especially toward the extremities, which are also much longer in proportion to the enrolled portion of the shell.

Section NEOSIMNIA Fischer.

Simnia (Neosimnia) intermedia Sowerby.

Ovulum intermedium Sby., Spec. Conch., No. 1, p. 9, figs. 32, 33; Thes. Conch. *Ovulum*, No. 40, p. 479, pl. c. figs. 61, 62, 1848. Reeve, Conch. Icon. *Ovulum*, pl. vii. figs. 33 a, 33 b, March, 1865.

Habitat. Station 247, off Grenada, in 170 fms. Honduras Bay (Sowerby). Vera Cruz, Mexico (Strebel). Off Hatteras, in 50–65 fms., sand, U. S. Fish Commission Stations 2595 and 2596.

This species is reasonably constant in form, but varies very much in size and in the acuteness of the extremities of the shell. Older specimens have these more blunt. The largest and smallest adult shells I have examined measured 27.0 and 15.0 mm. in length respectively. Tryon refers *O. oblonga* of Martini and *O. spelta* Dillwyn, non Linné, to this species as synonyms.

Simnia (Neosimnia) uniplicata Sowerby.

Ovulum uniplicatum Sowerby, Thes. Conch., p. 478, pl. c. figs. 30, 31, 32, 1848; P. Z. S. 1848, p. 135. Reeve, Conch. Icon. *Ovulum*, pl. ix, figs. 51 a, 51 b, May, 1865.

Amphiperas canadinensis "Mörch," Weinkauff, Jahrb. Mal. Ges., IX. p. 178, 1882, = err. typog. for *carolinensis*.

Ovulum antillarum Reeve, Conch. Icon. *Ovula*, fig. 64, 1865.
Ovula carolinensis Mörch, Malak. Blätt., XXIV. p. 54, 1877.
Ovulum subrostratum Sowerby, P. Z. S. 1848, p. 136; Thes. Conch., p. 477, pl. c. figs. 39, 40, 1848.
Ovulum arcuatum Reeve, Conch. Icon. *Ovulum*, fig. 58, 1865.

Habitat. Dead at Station 2, in 805 fms. Living in 2–20 fms., dead in 12–100 fms., from the Antilles northward to within twenty miles of Cape Hatteras, North Carolina.

The adolescent shell is beautifully spirally wavy-striate; in the adult the striæ are near the ends only, or wholly absent. It varies from fine deep plum-color or sulphur-yellow to white. The yellow ones are found on the yellow, and the purple ones on the purple Gorgonias or sea-fans, respectively. The larval shell has four whorls, while one or two more turns may be made by the adolescent shell (about 3.5 mm. long) before the former is entirely hidden. The apex of the nucleus is blunt and of a reddish color, while the surface of the rest is paler and covered with sharp liræ, close set and parallel with the lines of growth. The sutures are evident but not pronounced. The adolescent shell, exclusive of that which is truly larval, is of a whitish color in the specimen examined, and has only fine spiral *Cylichna*-like striation. It has a distinct columella, sharply truncate in front, and a wide canal, while at the apex the shell is wound obliquely back over the nucleus, hiding about one half of it, and is produced in a short canal beyond the extreme tip. There appears to be a little over a whorl and a half subsequent to the original larval shell, and it would require just about one whorl more wholly to enclose it. The larval shell would seem to have been about a millimeter long, or perhaps somewhat less, before the adolescent part was begun.

Simnia (Neosimnia) aureocincta n. s.

This shell is the Antillean analogue of *S. spelta* (Linn.) Tryon, and is best described by comparison with it.

Its surface is almost entirely destitute of the fine spiral striations of *S. spelta;* its base is much more arched, the canals at either end are broad, blunt, and recurved, instead of pointed and straight; the color is pure white with a golden yellow band winding round the shell just behind the periphery, and a yellow brown line bordering the outer edge of the callus on each side. *S. spelta* varies from waxy white to purple, without bands or margination. On the base in the present species the body is more symmetrically fusiform, the body callus more diffused, the aperture narrower, especially in front, and the posterior fold stronger and larger. The back of *spelta* from end to end forms a low nearly uniform arch, in *aureocincta* the ends are abruptly turned up and heavily thickened with callus. Max. lon. of shell, 18.5; max. lat. of shell, 8.0 mm.

Habitat. Living on Gorgonia, off Sombrero, in 70 fms. Also at U. S. Fish Commission Station 2334, near Havana, Cuba, on white coral, in 67 fms.

In this connection it may be observed that *S. spelta*, which is the common Mediterranean form, when young does not appear to resemble the shell figured by Risso, which has by many naturalists been taken to be the young of it. His *S. nicaënsis* seems to me to be a species more like *S. lanceolata*. His *S. purpurea* also, as represented in the Weinkauff collection, contained in that of Jeffreys now in the National Museum, is a distinct and different shell from the young of the purple variety of *S. spelta* L. (not Reeve & Sby.) which has commonly been so referred. I do not find the genuine *S. purpurea* of Risso figured in the monographs, or at least the shell so identified by Weinkauff and which is a native of the Mediterranean.

The only other member of this family from this region so far known is the *Amphiperas* (*Ultimus*) *gibbosus* Linné, which is common. The animal has the sides of the mantle enveloping the shell and is very gaudy, being of a salmon or golden yellow with large black circles and fine black dots scattered over it. It is found on corals and Gorgonias from Florida to Jamaica, and probably throughout the Antilles. It varies much in size, relative proportions, and brilliancy of color. The color of the brightest specimens will fade very much in a few years, even when kept in the dark. Fresh specimens are of a charming orange-color.

A specimen of *Amphiperas aperta* Sby. is in the collection of the National Museum from Barbados, and *A. birostris* Linné, which Tryon regards as the adult form of *aperta*, was recorded from Cuba, in 1840, by Pfeiffer. I feel some doubt as to these specimens, and suspect they may be imported, but it is possible this shell does exist in the Antilles.

The British species, *Ovula patula* of authors, has a larval shell similar to the one described under *Simnia uniplicata*, but it is smaller and shorter, with a smooth whitish globular nucleus.

Genus **PEDICULARIA** Swainson.

Pedicularia decussata Gould.

Plate XIX. Figs. 9 a-b.

Pedicularia albida Dall, Bull. M. C. Z., IX. p. 39, 1881.
Pedicularia decussata Gould, Proc. Bost. Soc. Nat. Hist., V. p. 127, 1855; Otia, p. 215, 1862.

Habitat. Barbados, Hassler Exp., 100 fms. Off Havana, Sigsbee, 450 fms., on *Solenosmilia variabilis* Dum. *fide* Pourtalès. Yucatan Strait, 640 fms. U. S. Fish Commission Stations 2342, off Havana, Cuba, in 201 fms., coral, and 2416, off the coast of Georgia, in 27 fms., coral, bottom temperature 53°.8 F. Off Georgia and Florida in 400 fms., Gould.

When I described this species its characters did not seem in accord with the brief diagnosis of Dr. Gould's unfigured species. Since then I have visited Albany, and examined Dr. Gould's type, which leaves no doubt of their identity. The reception of more material from the Fish Commission and from the Mediterranean enables me to enlarge my description of this species, and to compare it with *P. sicula.*

In regard to the shell, it is noteworthy that the spiral nucleus, which, as Gould observed, is always visible, is practically identical in form and sculpture with that of *Simnia*, just described. In fact, *Pedicularia* would seem to be a form of *Amphiperas*, modified for the habitat upon a coral, and made irregular by its habitat, as in the case of *Rhizocheilus*, etc. From *Simnia*, living on Gorgonians, to *Pedicularia*, living on stony corals, is a very short step. The dentition is not dissimilar, and I see no reason for separating *Pedicularia* from the *Amphiperasidæ.*

The decussated sculpture is characteristic of the young, and of the period before the animal has permanently settled down to one roost. At the end of this period the margin is usually reflected, thickened, and internally lirate. After this the spiral (or, as the shell stands, vertical) sculpture becomes stronger, the transverse fainter, and the former has a wavy irregularity, while the surface takes on a peculiar faint sagrination, recalling the surface of the coral on which it lives. The largest specimen I have seen — which is 13.0 mm. long by 8.5 from back to base, and 6.0 mm. in maximum width — is suffused toward the aperture with a delicate rosy blush. The sculpture is constantly different from that of *P. sicula*, which has the revolving threads in the young alternately faint and very strong instead of regularly decussated, has not nearly as many whorls, and has its nucleus always wholly concealed except in the very youngest specimens. The young shell has not the form of *Trivia*, nor is the columella plicate, as stated by Tryon (Man., VII. 241).

In the very large specimen referred to, the mantle margin was thickened and papillose, notched in the middle line behind; the foot oval, rounded behind, more pointed in front; the head small, the tentacles narrow, short, and without eyes or eye pedicels. The cavity of the mantle is very large and deep; there is the ordinary pectinibranch gill stretching across the dome of this cavity, with the anal papilla at its distal extreme on the left side of the head. What would seem to be the sexual papilla, large, prominent, globulose, is situated at the other extreme on the right, almost as far back as the posterior end of the foot. The soft parts make a coil of two whorls. The space upon the branch of coral (generally a Madrepore) where the animal roosts, and the edge of which the aperture of the shell exactly fits, is smoothed away and marginated, looking as if the animal had secreted a pavement, like *Capulus*, with a centrally situated rougher area. This, however, is not really the case, but the coral has been so eroded as to present much the same appearance, at least with *P. sicula*, as I have not yet received *P. decussata* in situ.

The eggs are very numerous and small. They are impregnated within the ovisac, which, when ready to discharge, seems to comprise a very large percentage of the total mass of the viscera. In the specimen examined, the young shells within the mother had about three quarters of a whorl formed, were of a brownish color, and covered by a thin smooth pellucid membrane. They seemed to be massed in the ovisac with no regularity or attachment, but like a lot of peas in a bag, and could be distinctly observed through the transparent integument.

FAMILY CYPRÆIDÆ.

Genus CYPRÆA LINNÉ.

Cypræa cinerea GMELIN.

Cypræa cinerea Gmelin, Roberts in Tryon, VII. p. 166, pl. ii. figs. 15, 16, 1885.

Habitat. Station 2, 805 fms. Sigsbee, off Havana, Lat. 22° 9′ and Lon. 82° 2′, in 177 fathoms. Station 278, in 69 fathoms, Barbados, all young dead specimens.

This species extends from the vicinity of Cape Hatteras to and throughout the Antilles, and the adjacent continental shores, in suitable localities. It was found living among the corals, at low water, on the reefs about Key West, by Hemphill.

It varies very much in size. One adult specimen from near Havana measures 17.5 by 11.0 mm. Others from the Arrowsmith Bank, near Yucatan, 38.5 by 24.0 mm. It changes color a good deal by exposure, and varies among individuals.

Among the other Cypræas, *C. mus* L. and *C. lurida* L. are certainly West Indian, although Mr. Roberts does not mention it in his latest monograph. *C. cervus* L. reaches South Florida, and is more or less spread among the Antilles. It is undoubtably synonymous with *C. exanthema*, and, curiously enough, of a very large and fine East American series, chiefly from Florida, nearly all are typical *cervus*, which is supposed to be the West American form, while the typical *exanthema* supposed to be the Antillean type is much less abundant. As a rule, however, the West American specimens of *cervus* are a little paler and thinner than the eastern ones.

C. spurca L. and its variety *flaveola* are common in the West Indies, and extend northward to the Florida Keys. The bright-colored, white-based, few-toothed variety is more common, especially northward, than the typical form characteristic of the Mediterranean. Some of the specimens from Florida and the Swan Islands are wider and more lozenge-shaped than any I find figured. *Cypræa bicallosa* Gray and *Aubryana* Jouss. appear to be Antillean. *C. nebulosa* Kiener (Cape of Good Hope), *C. stercoraria* L. (probably *mus*, junior, was mistaken for it), and *C. picta* Gray (Cape Verde Isl.) are exotic, and have been wrongly credited to this region, like *C. moneta*, etc.

Genus TRIVIA Gray.

Trivia pediculus Linné.

This species was not obtained by the Blake, but ranges from St. Augustine southward to and among the Antilles, varying greatly in size and brilliancy of coloration. It is fossil in the pliocene clays of Costa Rica and the Caloosahatchie pliocene of South Florida. *T. labiosa* Gaskoin and *T. cimex* H. Owen are synonyms.

Trivia suffusa Gray.

Trivia suffusa Gray, Roberts in Tryon, Man., p. 201, pl. xxi. figs. 1, 2, 100, 1885.

Habitat. Off Havana in 80 fms. (dead), Sigsbee. Cedar Keys, Florida, living on the reefs in 1–3 fms., and southward to and among the Antilles at moderate depths. Fossil in the Caloosahatchie pliocene.

This species is sometimes deep rose with blackish mottlings, varying from rosy or madder brown without black markings to nearly totally blackish brown. On the mainland it has been received from Vera Cruz and the coast of Yucatan. *T. armandina* Duclos is synonymous according to Roberts, and the dark variety mentioned above is on the same authority the same as *T. pullata* H. Owen.

Trivia subrostrata Gray.

Trivia subrostrata Gray, Roberts, Bull. M. C. Z., IX. p. 137, 1881. Tryon, Man., VII. p. 203, pl. xxii. figs. 38, 39, 1885.

Habitat. Sigsbee, off Havana, 80 and 175 fms. Station 12, 177 fms.; Station 2, 805 fms. (dead). Southeastward to Barbados, living at moderate depths.

Trivia nivea Gray.

Trivia oryza Roberts, Bull. M. C. Z., IX. p. 137, 1881, non Lam.

Trivia nivea Gray, Roberts, Tryon, Man., VII. p. 199, pl. xxi. figs. 80, 81, 1885.

Habitat. Station 2, in 805 fms. Station 272, at Barbados, in 76 fms., dead. South Florida reefs, Greegor, living.

Trivia candidula Gaskoin.

Trivia candidula Gaskoin, Roberts, Bull. M. C. Z., IX. p. 137, 1881. Tryon, Man., VII. p. 203, pl. xxii. figs. 33, 34, 1885.

Habitat. Yucatan Strait, 640 fms.; Station 21, 287 fms.; Barbados, 100 fms.; Sigsbee, off Havana, 119 fms.; Station 177, living, in 18 fms., at Dominica; Station 272, in 76 fms., near Barbados; also in 94–140 fms., at Barbados, all dead. Near Cape Hatteras, in 25–50 fms., U. S. Fish Commission. Corunna, Spain, McAndrew.

This species ranges farther north than any other yet known, on the eastern coast of the United States. It is easily recognized by the continuous transverse lines, uninterrupted by any dorsal groove, and its white color. It is *T. olorina* Duclos and *T. approximans* Beck.

Trivia globosa Gray.

Trivia globosa Gray, Roberts, Bull. M. C. Z., IX. p. 137, 1881.
T. pilula Kiener, and *T. sphærula* Mighels, *fide* Roberts, 1885.

Habitat. Station 2, 805 fms.; Station 247, near Grenada, in 170 fms.; Station 276, near Barbados, in 94 fms. All dead. U. S. Fish Commission Station 2373, in 23 fms., coral bottom, in the Gulf of Mexico, living. Station 2330, dead, in 121 fms., at Key West. Fossil in the Caloosahatchie pliocene.

Roberts thinks that Krebs's *Trivia subrostrata* var. *alba* is referable to this species.

Trivia quadripunctata Gray, var. rotunda Kiener.

Trivia quadripunctata Gray, Roberts, Bull. M. C. Z., IX. p. 137, 1881. Tryon, Man., VII. p. 201, pl. xxii. figs. 5, 6.

Habitat. Yucatan Strait, 1 living, 640 fms.; Station 2, 805 fms.; Station 12, 177 fms.; Barbados, living, 100 fms.; Sigsbee, off Havana, 80 fms. Florida Keys, in 2–4 fms., living, and abundant in the Antilles, in similar situations.

I do not understand how living specimens found their way into jars labelled 100 and 640 fms. I do not believe the shells lived at that depth, and suspect they may have remained in the dredge or sieve, unseen, from a previous dredging in shallow water. The specimens, except the two living ones, are all of the variety *rotunda* Kiener, which differs from the type in being shorter, rounder, paler, and with the spots obsolete. As with the other species, the identifications have been confirmed by Mr. S. R. Roberts, who has made a special study of the *Cypræidæ*.

Genus **ERATO** Risso.

Erato Maugeriæ Gray.

This species extends from Cape Hatteras to Jamaica, and from Florida to Vera Cruz and Aspinwall. It is the only species known from the region. It is fossil in the pliocene of the Caloosahatchie River, Florida. *Erato cypræoides* C. B. Adams is not in the least like it, being white, cypræiform, with an immersed spire and both lips transversely grooved. It is probably not an *Erato* at all, and is perhaps an *Ovulactæon*. The *Erato vitellina* cited by Marrat in his list of shells collected by the party on board the Argo, undoubtedly came from California, and it should have been so stated, as, placed as it was without comment in a paper treating otherwise only of Antillean shells, it was certain to lead to misconception. Although Mr. Marrat says it was a gift from Mr. Redfield at Philadelphia, it follows the Abaco list without sufficient discrimination.

FAMILY TRIFORIDÆ.

Genus **TRIFORIS** DESHAYES.

The character of the openings in this group seem to have been misunderstood by Mr. Tryon in his recent monograph. He referred (Man., IX. p, 121) to the "occasional preservation of a second canal upon the back of the body whorl, showing the termination of a former aperture." I have never seen anything of the kind in this genus, nor does Mr. Tryon figure any such formation. The case of *Triforis* is not unlike that of *Pleurotoma*, except that in the latter group the seclusion of the individual foramina is, so far as I know, never carried quite so far as in typical *Triforis.* In both there is an aperture with a canal and a presutural (doubtless anal) notch in the adult. In some forms of *Drillia*, when fully mature, the notch becomes nearly tubular, but the siphonal canal is not closed and seldom if ever has a tubular appearance. In *Triforis*, however, the canal and anal opening, in certain species, become completely tubular, and the last whorl after they are closed is continued for a quarter of a turn more before the final adult aperture is completed. Between this state of things and that in which the canal remains permanently open and the anal notch becomes obsolete, there are all varieties of gradation, many of which represent stages of growth in the most specialized forms. There are probably some dextral forms, though such are apt to be referred to *Cerithiopsis;* and probably some of those referred to this group would, if we knew all the characters of the soft parts, operculum, etc., be naturally placed with *Cerithiopsis*, as reversed species of that genus.

I have felt that the differences of the soft parts, dentition, and operculum were sufficient to authorize the use of the family name for this group, as has been proposed by other naturalists. A great number of sectional names have been proposed in this group. Most of them are without sufficient reason for existence. We may conveniently recognize *Inella* Bayle (+*Ino* Hinds, thrice preoccupied), for the elongated species with flattened whorls, open anal aperture, and sharp apex; *Sychar* Hinds, for similar shells having a swollen nucleus and more rounded whorls; *Mastonia* Hinds, for the short, swollen fusiform species with the same character of aperture; and *Triforis* s. s., for those in which the anal sinus is closed, and all the foramina have a more or less tubular form, when completely adult. These shells are so frequently decollate, rubbed, or not perfectly adult, that the proper section to which they are to be referred, except in the case of species collected alive and in large quantities, will necessarily often remain doubtful.

The variety in the sculpturing is very remarkable, and the range of variation in this direction is as yet but little understood.

Section TRIFORIS s. s.

The only species definitely referable to this section within our limits is the *Triforis mirabilis* C. B. Adams, which extends southward from the Carolina coast to the Antilles, apparently not abundant anywhere. It has been erroneously confounded with *T. turris-thomæ* Orbigny.

Triforis lilacina Dall.

Shell corpulent, acutely pointed, characterized by two spiral rows of round, pointed, large elevated tubercles, about twenty-five on the last whorl; there they are separated by a fine undulated line, while on the earlier whorls this is obsolete or absent; there is a very fine post-sutural thread; whorls about 18, of a rich pink lilac color, the tubercles a little lighter; base protuberant, with four or five regularly beaded spiral threads; canal closed, much recurved, short; anal notch deep, probably eventually tubular; mouth contracted, anterior edge produced, aperture sharp-edged, simple. Max. lon. of shell, 9.0; max. lat. of shell, 2.9 mm. (Nucleus lost, probably pointed.)

Habitat. Turtle Harbor, Florida, in 6 fms., Dr. Rush.

This beautiful shell is nearest to *ruber* Hinds, which has smaller tubercles and proportionally larger aperture. This and *violacea* Quoy (with five rows of tubercles) are Indo-Pacific species.

Section MASTONIA Hinds.

A. *Apex acute, trochoid.*

Triforis perversa Linné, var. nigrocincta Adams.

Trochus perversus Linné, S. N., ed. xii. p. 1231.
Cerithium perversum Jeffreys, Brit. Conch., IV. p. 261, 1867.
Cerithium adversum Forbes & Hanley, Brit. Moll., p. 195, pl. xci. figs. 5, 6.
Triforis perversa Jeffreys, P. Z. S. 1885, p. 57.
Cerithium nigrocinctum C. B. Adams, Boston Journ. Nat. Hist., II. p. 286, pl. iv. fig. 11, 1839.

Habitat. Barbados, 100 fms. Northward to Massachusetts. British Isles to the Mediterranean. California ?

After a careful study of specimens from both sides of the Atlantic, I conclude that the differences which exist are far less than those which separate the large pale-tubercled Mediterranean variety from the small British variety *adversa* Montagu, and cannot be claimed as of more than varietal importance.

The British shell is usually more solid and uniformly dark, but there are paler individuals with dark base, differing from typical *nigrocincta* only in being a little heavier. But nearly all British individuals are heavier than those of the same species from the American shores. The sculpture of many of the British individuals is a little coarser, and they probably average a little bigger than American specimens.

The variety *nigrocincta* is usually brown with a dark brown base; this shining through the sides of the shell below the suture gives the effect of a brown presutural band. Individuals in which the base is no darker than the sides do not show it. *T. modesta* C. B. Adams is a small uniformly dark specimen, and his *T. intermedia* is (from a typical specimen) a form in which the middle spiral has its nodules paler colored than the rest of the shell.

Two or three genera or subgenera have been founded on this species, as having the canal open and the whorls flattened, but the canal is often closed in both foreign and American specimens, and the form is precisely that of *Mastonia*, sometimes flattish, but most generally moderately inflated and fusiform.

Triforis decorata C. B. Adams var. olivacea Dall.

Cerithium decoratum Adams, Contributions to Conch., p. 177, 1850.

Habitat. Gulf of Mexico, west of Florida, in 50 fms. Key West, Hemphill. Antilles, Adams.

This species does not show the anal notch tubular when perfectly adult, consequently it should not be placed in the typical section of *Triforis,* as has been done in Mr. Tryon's Manual. It is closely related to *T. ornata* of Deshayes.

The Floridian specimens are of a more olive and brown tendency, and are also larger and have a greater proportional diameter than the types of Adams or any of the Antillean specimens I have seen. The latter all tend to a maculation of blackish brown and white, are smaller, and more slender. The distinction seems of varietal importance, though it would doubtless shade off imperceptibly in a full geographical series.

B. *Apical nucleus swollen, mammillary.*

Triforis turris-thomæ Orbigny.

Triforis turris-thomæ (Chemnitz) Orb., Moll. Cub., II. p. 155 (pl. xxiii. figs. 10–12 ?), 1842. Dall, Bull. M. C. Z., IX. p. 81, 1881.

Triforis intermedius Tryon, Man., p. 188, 1887, not of C. B. Adams, 1850.

Habitat. Station 2, 805 fms., one dead specimen, probably drifted from shoaler water. Reported by Orbigny in shell sand from Cuba and Guadelupe Island.

This species is not distinguishable from Chemnitz's figures, and his work is only accidentally now and then binomial. Its name rests upon Orbigny's figure and description. Doubtless he would have confounded it with *T. mirabilis*, but his figure identifies the species sufficiently. Adams may have confounded it with his own *intermedius*, and so named it, but his type specimens of the latter are of a not rare variety of *perversa*. His description is eight years later than the publication of Orbigny's Atlas, and his name would in any case be out of court on that account, if they were identical.

Section INELLA Bayle.

Nucleus acute, conical, trochoid; whorls flattened.

The following *schema* of the species of this section may serve to assist the student in identifying material which may come into his hands. In case of any discrepancy between the figure and the diagnosis, the latter is *always*, in this Report, to be regarded as the more correct.

A. *With three principal spirals.*

T. longissima Dall. Three spiral rows of very prominent tubercles; middle tubercles opposite interspaces of the two outer rows; anterior row most prominent of the three; a fine thread behind the suture; no transverse ribs.

T. triserialis Dall. Three spiral tuberculated threads; tubercles axially parallel; posterior row strongest; a fine thread behind suture; no ribs; shell somewhat short and swollen.

T. triserialis var. *aspera* Jeffreys. Last whorl but one of adult with 20 broadish, rather straight transverse ribs, overrun by two sharp not nodulated threads with their posterior slope shortest; the ribs nodulous under the threads; a nodulous smaller thread in front of the suture, a still smaller simple thread behind the suture; whorls flat, shell elongate. The Antillean specimens have more convex whorls. A specimen from the quaternary of Messina shows no post-sutural thread.

T. triserialis var. *intermedia* Dall. Two rows of not prominent apically inclined nodules, a smaller undulated thread between them, a still smaller one behind the suture; undulations of the medial thread opposite the interspaces between the nodules; no ribs; young with proportionally stronger nodules; shell rather elongated.

T. sarissa Dall. Three rows of strong tubercles, with their longest slope toward the middle of the whorl, posterior row largest, anterior next in size, the third close to the posterior row and smallest; suture not bordered by threads and nearly invisible.

B. *With two principal spirals.*

T. colon Dall. Two spiral rows of equal nodules overrun and connected by a sharp line; a very fine undulate line on each side the suture; no ribs, whorls very short and flat; base flattish; shell slender and small.

C. *With one principal spiral.*

T. Rushii Dall. An anterior row of 16 very large and pointed (almost spinous) tubercles next the suture; behind this three much finer and lower undulated equal threads; no ribs; whorls flat except for the garland of tubercles; shell milk-white, small.

The last mentioned, though only a fragment of four and a half whorls, presents such a remarkable and peculiar sculpture that I have no hesitation in applying a name to it. The length along the axis from the garland of tubercles on one whorl to its fourth return, thus including three whorls, is 2.6 mm.; the width over the tubercles at the apical end (decollate) was 1.5 mm., and at the other end (of four whorls) it was 1.75 mm. The turns are rather oblique, and the undulations of the fine threads form oblique transverse series. It was collected by Dr. W. H. Rush, in 200 fms., west of North Bemini Island, Bahamas, and kindly donated by him to the National Museum.

Triforis (Inella) longissima Dall.

Plate XX. Fig. 10.

Triforis (*Ino*) *longissimus* Dall, Bull. M. C. Z., IX. p. 80, 1881. Agassiz, Three Cruises of the Blake, II. p. 71, fig. 295, 1888.

Habitat. Sigsbee, off Havana, in 175–450 fms.

In this and several other cases I was led, by the careless practice of authors who have erroneously treated the name *Triforis* as masculine, to give the specific names in my Preliminary Report a masculine termination.

Triforis (Inella) triserialis Dall.

Plate XX. Figs. 5 a, 6 a.

Triforis triserialis Dall, Bull. M. C. Z., IX. p. 84, 1881.

Habitat. Yucatan Strait, 640 fms. Off Cape San Antonio, 640 fms. Station 2, in 805 fms. Station 282, near Barbados, in 154 fms., sand, bottom temperature 56°.0 F.

Triforis (Inella) triserialis var. aspera Jeffreys.

Triforis aspera Jeffreys, P. Z. S. 1885, p. 58, pl. vi. figs. 7, 7 a.

Habitat. North Atlantic, Porcupine Expedition. Mediterranean, Jeffreys. Florida Straits, off the Samboes, Pourtalès, in 125 to 731 fms. Off Georgia in 440 fms., sand, U. S. Fish Commission. I have compared Jeffreys's types with the type of *T. triserialis*, and consider the differences varietal.

Triforis (Inella) triserialis var. intermedia Dall.

Plate XX. Fig. 8.

Triforis intermedius Dall, Bull. M. C. Z., IX. p. 85, 1881.
Not *T. intermedius* C. B. Adams, 1850.

Habitat. Station 2, in 805 fms. Barbados, in 100 fms.

Triforis (Inella) sarissa Dall.

Shell glossy white, elongated, subcylindrical, with about twenty-four peculiarly sharp-pointed tubercles on the last whorl; whorls about 24, sculpture (see *schema*, p. 245) sharp, clear-cut, and limose; base flattish with a strong keel, two less strong spiral threads, and one or two fainter ones on the canal; canal rather long, moderately recurved; anal notch marked, but probably not tubular; aperture subrectangular, modified by the spirals; inner lip thickened, projecting. Lon. of shell, 15.5; of last whorl, 3.0; max. lat. of shell, 2.5 mm.

Habitat. Station 290, near Barbados, in 73 fms., coral, bottom temperature 71°.0 F.

This shell recalls *T.* (*Sychar*) *inflata* Watson, in its general appearance, but the details of the sculpture are quite different, and the shell is more cylindrical. Its differential characters in its own section are referred to in the *schema*.

A notable peculiarity is the way in which a large part of the tubercular sculpture seems to incline toward the apex.

Triforis (Inella) colon Dall.

Plate XX. Fig. 12.

Triforis colon Dall, Bull. M. C. Z., IX. p. 86, 1881.

Habitat. Off Havana, in 450 fms., Sigsbee. Off Cape San Antonio, in 640–1002 fms.

Section SYCHAR Hinds.

Nucleus mammillary, swollen, whorls convex.

The following *schema* may be useful for the species referred to.

A. *With three strong spirals.*

T. samanæ Dall. Spirals crowded, with crowded tubercles, rope-like; anterior largest, posterior smallest, so that each whorl at the suture overhangs the succeeding whorl; base flattish, with three tuberculate cords; shell white, strong.

B. *With two strong spirals.*

T. bigemma Watson. Two strong spirals nodulating over transverse hardly rib-like waves; a fine undulated thread in front of the suture; both lips of the suture appressed, often thread-like; base and sutures brownish, shell otherwise white; subcylindrical, elongated.

T. (*bigemma* var. ?) *hircus* Dall. Two sharp peripheral threads reticulating short peripheral transverse ribs, nodose at the intersections; the space between the anterior spiral of one whorl, and the posterior one of the next whorl excavated, smooth, with the sutural lips appressed, but no pre-sutural thread; subconic; otherwise like *bigemma.*

T. abrupta Dall. Sculpture similar to *bigemma*, but shell smaller, shorter, more inflated and *Mastonia*-like; with a well marked thread behind the suture, and the transverse waves obsolete.

T. torticula Dall. Two strong not nodulous spirals undulated by numerous shallow transverse sulci; a fine post-sutural thread; in front of the suture, between it and the posterior primary spiral, one or two fine strongly undulate or subtuberculate threads, the anterior one fainter; base convex with three threads in the young; base smooth, flat and keeled in large not quite adult individuals; shell large, subcylindric, white.

T. inflata Watson. Two spiral rows of equal tubercles on flat whorls without ribs or waves; a marked, hardly undulate thread behind, and a still smaller one before the suture; shell white, elongated.

T. inflata var. *ibex* Dall. Like the last, but tubercles more sparse and obliquely set, anterior sutural thread obsolete.

T. inflata var. *filata* Dall. Like *ibex*, but with three fine threads at the suture; shell less cylindrical and proportionally wider.

C. *Without primary spirals.*

T. cylindrellus Dall. One small post-sutural thread; two or three shallow spiral grooves, cutting numerous oblique transverse sulci; whorls swollen, constricted behind; base very convex; shell small, slender, white.

Triforis (Sychar) samanæ Dall.

Shell white, opaque, solid, of 12–14 whorls; main body of the shell subcylindrical, but the apex more rapidly tapered. Sculpture of (on the last whorl) three coarse close-set spirals, covering the whole whorl, each with about thirty closely packed tubercles, like buns strung on a cord, longer axially than in the other direction; base similarly tubercularly corded with three cords, the interspaces deep; canal very short, aperture short, squarish, modified by the sculpture. Max. lon. of shell, 10.0; of last whorl, 2.7; max. lat. of shell, 2.8 mm.

Habitat. Samana Bay, Santo Domingo, in dredgings from about 16 fms.

This recalls *T. decorata* C. B. Adams, but in that species the sculpture is not crowded, the tubercles are strictly intersectional, and the whorls do not overhang each other.

Triforis (Sychar) bigemma Watson.

Triforis bigemma Watson, Journ. Lin. Soc., XV. p. 101, 1880; Dall, Bull. M. C. Z., IX. p. 81, 1881; Watson, Chall. Gastropods, p. 562, pl. xliii. fig. 6, 1885.

Habitat. Yucatan Strait, in 640 fms. Near St. Thomas, in 390 fms., Challenger Expedition.

Triforis (bigemma var.?) hircus Dall.

Plate XX. Fig. 11.

Triforis hircus Dall, Bull. M. C. Z., IX. p. 83, 1881.

Habitat. Yucatan Strait, 640 fms.

Triforis (Sychar) abrupta Dall.

Plate XX. Fig. 9.

Triforis (*bigemma* Watson var.?) *abruptus* Dall, Bull. M. C. Z., IX. p. 84, 1881.

Habitat. Cape San Antonio, 640 fms.; Yucatan Strait, 640 fms.

Triforis (Sychar) torticula Dall.

Plate XX. Fig. 11 b.

Triforis torticulus Dall, Bull. M. C. Z., IX. p. 82, 1881.

Habitat. Yucatan Strait, 640 fms.

Triforis (Sychar) inflata Watson.

Gerithium (*Triforis*) *inflatum* Watson, Journ. Lin. Soc., XV. p. 101, 1880; Dall, Bull. M. C. Z., IX. p. 81, 1881; Watson, Chall. Gastropods, p. 564, pl. xl. fig. 1, 1885.

Habitat. Yucatan Strait, 640 fms. Off Culebra Island, in 390 fms., Challenger Expedition. Off Georgia, in 440 fms., sand, bottom temperature 45°.6 F., at Station 2414; and at Station 2662, in 434 fms., sand, off St. Augustine, Florida, bottom temperature 43°.7 F., U. S. Fish Commission.

Triforis (Sychar) inflata var. ibex Dall.

Plate XX. Fig. 12 b.

Triforis ibex Dall, Bull. M. C. Z., IX. p. 86, 1881.

Habitat. Yucatan Strait, off Cape San Antonio, in 640 fms. Off Havana, in 450 fms., Sigsbee.

Triforis (Sychar) inflata var. filata Dall.

Habitat. Station 136, near Santa Cruz, in 508 fms., soft ooze, bottom temperature 42°.5 F.

Triforis (Sychar) cylindrella Dall

Plate XX. Fig. 6.

Triforis cylindrellus Dall, Bull. M. C. Z., IX. p. 83, 1881.

Habitat. Cape San Antonio, 640 fms.

Family CERITHIOPSIDÆ.

The existence of a retractile proboscis in *Cerithiopsis* and *Seila* is quite ground enough, were there no other characters, for separating this group as a family from the *Cerithiidæ*.

Genus SEILA A. Adams.

Seila A. Adams, Ann. Mag. Nat. Hist., VII. p. 130, 1861; type *S. dextroversus* Ad. & Reeve. (China Seas.)
Viriola Jousseaume, 1884, not of Tryon, 1887.
Cinctella Monterosato, Nom. Conch. Medit., p. 123, 1884; type *C. trilineatum* Philippi. (Mediterranean.)

The close resemblance of *S. dextroversa* to the *C. terebralis* C. B. Adams, so far as shell characters are concerned, is warrant in default of negative evidence for combining the two forms in one group. The characters of *C. terebralis*, as worked out by Stimpson and independently by myself, are sufficient to elevate *Seila* to the rank of a genus, and separate it entirely from *Cerithiopsis*, of which it has been regarded as a synonym. Jousseaume, whose work on *Triforis* I have been unable to consult, would apparently, judging from Tryon's remarks, regard *Seila* as a dextral *Triforis*, but this is an erroneous assumption, as I shall proceed to show, and the peculiar dentition and shell characters of *Triforis* are in my opinion a justification for according to it family rank by itself.

Seila terebralis C. B. Adams.

Cerithium terebrale C. B. Adams, Bost. Journ. Nat. Hist., III. p. 320, pl. iii. fig. 7, 1840.
C. terebellum C. B. Adams, Cat. Coll., p. 19, note, 1847.
Cerithiopsis terebellum Stimpson, N. Engl. Shells, p. 45, 1851.
Cerithiopsis terebralis H. & A. Adams, Gen., I. p. 241, 1853.
?*Cerithium trilineatum* Philippi, En. Moll. Sicil., I. p. 195, pl. xi. fig. 13, 1836; Jeffreys, P. Z. S. 1885, p. 61.

Habitat in America. Massachusetts, southward to Florida and the Antilles. ?Europe, in the Mediterranean, extremely rare.

I have carefully examined Dr. Jeffreys's series of *trilineatum*, recent and fossil, and do not feel that it justifies the consolidation. The fossil is a much more slender cylindrical and less conical shell with shorter whorls than *S. terebralis*, and so far as the specimens indicate never attains the size which adult *terebralis* commonly exhibits. Otherwise the sculpture is very similar. The recent Sicilian shell is extremely rare and much more like *terebralis*, which Philippi, who had received the American shell from Pfeiffer, identified with it. The recent and fossil forms seem to differ from each other in a sufficiently marked way to render it most desirable to limit *trilineatum* to the fossil to which it was originally given, and retain Adams's name for the recent shell.

The characters of the animal of *Seila terebralis* are such as definitely to separate it from *Cerithiopsis*.

The tentacles are short and stout; the eyes are situated on their outer bases. The foot is very short, indented in the median line in front, bluntly rounded behind, and hardly more than one half longer than its own breadth. There is a narrow mentum and the animal possesses a retractile proboscis. The operculum is very peculiar, being subtriangular, its front edge arched, the lateral margins thin, the posterior angle free, stout, hard, not spiral, but its tip curved to the left. It is a little longer than wide, and when retracted the little hook at the apex is caught under the twisted pillar. The opercular lobe is simple. There are stout jaws composed of numerous scale-like pieces. The rhachidian tooth is sub-rectangular, tridentate, the median denticle of the cusp much smaller and shorter than the others; there is a squarish median boss on the base below the cusp. The major lateral is broad and rather high, with a wide and very short cusp, bidentate near its inner extreme. The two minor laterals are narrow, long, wider at the base and bidentate at the narrow tip.

In a general way the radula is more like that of *Cerithiella metula* Lovèn, as figured by Sars (Moll. Arct. Norv., pl. vii. figs. 4 a, 4 b), than any other species of the *Cerithiacea* whose dentition I have seen figured. The details above given show it to be quite different even from that form.

Genus **CERITHIOPSIS** Forbes & Hanley.

The type of this group is *C. tubercularis* Montagu, with which our most common species, *C. Greenii* Adams, agrees in the superficial characters of its soft parts. I have, however, not been able to distinguish in our species any such median pore and subsequent groove as is figured by Jeffreys for *C. tubercularis* (Brit. Conch., IV., pl. iv. fig. 5). The foot of the American species seems longer and narrower, as do the tentacles.

Cerithiopsis Greenii C. B. Adams has been referred to *C. tubercularis* Montagu, and to *C. minima* Brusina. It has a nucleus which, allowing for all variation, is larger and less styliform than that of *C. tubercularis*, while the aperture of *C. minima* is contracted in a way different from that of any specimens of *C. Greenii* I have ever examined. It would seem preferable to keep them distinct, though the sculpture and its range of variation in *tubercularis* and *Greenii* are very similar. The name of *C. Greenii* is much older than that of *C. minima*, and if they were identical would take precedence of it. Furthermore, from Florida I have received specimens collected by H. Hemphill at Key West, which seem to be the same as the British *tubercularis* except that the tubercles form spiral bands of pale medium and dark brown color. These differ from the *C. Greenii* collected in the same region just as the British and Mediterranean specimens do. The range of *C. Greenii* extends from Massachusetts Bay to Florida, Bermuda, and Santo Domingo. *Cerithium iota* C. B. Adams is, from typical specimens, merely a rather small variety of *C. Greenii.*

The operculum of *Cerithiopsis* is paucispiral, somewhat concave, with three or four whorls, rather translucent and smooth outside. I have not seen any figure of the dentition of *C tubercularis,* but gather from the statements of Gray, Tryon, and Jeffreys that the central or rhachidian tooth is large and bifid, the major laterals with bidentate cusps, and the other laterals elongate, simple, and smooth, without denticles.

Subgenus ? EUMETA (MÖRCH) FISCHER.

Eumeta Mörch, Faunula Moll. Islandiæ, Vid. Medd., p. 208, 1868; Fischer, Man., p. 684, 1883; Jeffreys, P. Z. S. 1885, p. 61 (*ex parte*).

The name of Mörch was simply inserted without any comment. Dr. Fischer, I believe, first gave it a definition, basing this on the dentition. Dr. Jeffreys united *Metaxia* with it, and used *Eumeta* to designate the blunt-tipped as distinguished from the typical acute Cerithiopsides.

Cerithiopsis (Eumeta ?) subulata MONTAGU.

Plate XX. Fig. 4.

? ? *Trochus punctatus* Linné, Syst. Nat., ed. xii., p. 1231, No. 603, 1766. Hanley, Test. Lin., pp. 324, 529, 1855.

Cerithium punctatum (L.) Philippi, Zeitschr. für Mal., V. p. 23, 1848; not of Brugière, Enc. Meth., p. 463, 1789.

Murex subulatus Montagu, Test. Brit. Suppl., p. 115, pl. xxx. fig. 6, 1808. Turton, Conch. Dict., p. 96, 1819. Dillwyn, Cat., II. p. 759, 1817.

Cerithium subulatum Jeffreys, Brit. Conch., IV. p. 264, 1867; not of Potiez and Michaud, Gal. Douai, 1838.

Cerithium metula Dan. (non Lovèn) in Jeffreys, Brit. Conch., IV. p. 257, 1867.

Cerithium Emersonii C. B. Adams, Bost. Journ. Nat. Hist., II. p. 284, pl. iv. fig. 10, 1838. Gould, Inv. Mass., p. 275, fig. 180, 1841.

Cerithium punctatum Philippi, Abbild. und Beschr., III. p. 99 (*Cerithium*, p. 6, pl. i.), pl. xx. 4, figs. 16, 18, 1849. Sowerby, Thes. Conch. Cerith., p. 880, pl. clxxxiv. fig. 240, 1855.

Cerithiopsis punctatum Tryon, Man., IX. p. 170, pl. xxxv. fig. 34, 1887.

Cerithium elegans Blainville, Faune Franç. Moll., p. 159, pl. lxii. fig. 9, 1827 (*fide* Tryon); not of Petit, 1853.

Cerithiopsis Emersonii H. & A. Adams, Gen. Rec. Moll., I. p. 240, 1858. Binney's Gould's Inv., p. 387, fig. 649. Verrill, Rep. Inv. Vineyard Sound, p. 648, pl. xxiv. fig. 151, 1873.

Habitat. Cape Cod southward to the Antilles. Station 247, off Grenada, dead, in 170 fms.

The *Trochus punctatus* of Linné is admitted by Hanley and Deshayes to be unrecognizable. Philippi thought he recognized it in our American shell. Others have followed him, including Tryon. If there were nothing else in the way, we might recognize the name as of Philippi, objectionable and wholly inapplicable as it is if the meaning of the word be considered. But Linné stated that his shell came from South Europe; Hanley intimates that it was a variety of *C. tubercularis*, and Brugière described an identifiable *Cerithium punctatum* long before the publication of Philippi.

The first name recognizable as belonging to our species was given by Montagu, under the supposition that the shell was British. In this way a number of Antillean species were first described. Since we have to give up the familiar name of *Emersonii*, it is fortunate that the new name is appropriate, and there is no necessity for resorting to guesswork in order to fix an unsuitable name upon our shell.

The southern specimens are lighter colored, except the base, which is visible in the purple brown line which distinguishes the suture in fresh specimens. As we go northward, the specimens are ruder and more olivaceous. By a study of the nuclei I have become convinced that they are little, if at all, less variable than the rest of the shell. Considerable variations do occur in the sculpture, size, and prominence of the nuclear whorls. The reliance of some authors on the nuclear characters, as something fundamentally constant, is certainly ill founded.

I have figured the specimens from Grenada as an example of the elegance of tropical individuals of this species, and the contrast of its tints is not less attractive than its sculpture.

The soft parts and dentition of this species have been examined by Stimpson, whose drawings and notes are in my hands. They indicate that the external appearance of the animal is much like that of *Cerithiopsis tubercularis* given by Jeffreys, previously cited, except that the foot is broader and shorter, and the tentacles more slender and acutely pointed. The operculum of *C. subulata* is paucispiral, of three whorls, thin, horny, and externally concave. The elements of the jaw are partly scale-like, and partly raised and pointed. But the dentition is quite peculiar. The median tooth is wide, with a narrow five-toothed cusp, and a cusp-like projection from the middle line of the base. The major lateral is extremely wide and short, its outer portion slightly curved and simple, the inner part with eight or nine small denticles; subequal, like those on the median tooth. The outer laterals, two in number, are long and narrow, the base notched, the cusp suddenly narrowed like a claw, and the inner edge of the claw with five or six fine denticulations.

It is entirely evident that this does not agree with the accounts given us of the radula of *C. tubercularis.* On the other hand, Stimpson's drawing does agree in the main with the dentition of *Eumeta costulata* Möller (*C. arctica* Mörch) as figured by Sars (Moll. Arct. Nov., pl. vii. fig. 5 b). The details differ, but the main features of the radulæ must be much alike.

In the absence of better data as to the teeth of *C. tubercularis,* I prefer to let the species remain in the genus, merely calling attention to the fact that this species must be removed from *Cerithiopsis,* and united with its congeners in a distinct group, if the differences of dentition above signalized are confirmed.

Section CERITHIOPSIS s. s.

Cerithiopsis crystallina Dall.

Plate XX. Fig. 3.

Cerithiopsis ? crystallina Dall, Bull. M. C. Z., IX. p. 89, 1881.

Habitat. West of Florida in 50 fms.; off Havana in 450 fms., Sigsbee; Barbados, in 100–103 fms.; Station 2, in 805 fms.; Station 20, off Bahia Honda, in 220 fms.; Station 36, in 84 fms.; Station 128, near Santa Cruz, in 180 fms., sand; Stations 132 and 134, off Frederikstadt, Santa Cruz, in 115–248 fms., sand; Station 176, off Dominica, in 391 fms.; Station 192, off Dominica, in 138 fms.; Station 210, near Martinique, in 191 fms.; Station 220, off Santa Lucia, in 116 fms., rocky bottom; Station 290, near Barbados, in 73 fms., coral. Bottom temperatures ranging from 43°.5 to 71°.0 F. Gulf of Mexico, Stations 2400 and 2403; south of Cuba, at Stations 2131 and 2135; Little Bahama Bank, at Station 2655, in 88–250 fms., U. S. Fish Commission. Cedar Keys, Florida, washed on the beach, dead, Hemphill.

This very abundant shell is remarkably uniform in its characters; the only difference I have observed in examining several hundred specimens, from different places, is that some are a little more slender and cylindrical than others. The tip of the larval nucleus is invariably lost, though a good part of the larval shell is usually preserved.

The animal is pale brown (in alcohol), with large long tentacles, very black well developed eyes, a broad short head, short rounded foot, and an externally concave, red-brown, few-whorled circular operculum. The opercular lobe appears to have several short processes on each side.

Cerithiopsis Sigsbeana Dall.

Plate XX. Fig. 1.

Cerithiopsis ? Sigsbeana Dall, Bull. M. C. Z., IX. p. 87, 1881.

Habitat. Station 5, 229 fms.; Station 20, 220 fms.

This is nearest *C. Martensii,* but the whorls do not overhang, and the arched lamellæ or incremental lines so prominent on the latter have no parallel in

C. Sigsbeana. It is smaller and more cylindrical also, and the whorls are much less marked off by the sutures.

Neither for this nor for the preceding species, *C. crystallina*, are the details of sculpture satisfactorily rendered on the figures. But the difficulty of getting a characteristic drawing of so minute an object from an unscientific artist is very great.

Cerithiopsis matara n. s.

Shell pale brown, straight-sided, conical, with sixteen compact whorls. Nucleus, beginning glassy, smooth, and saccular, in the second whorl becomes strongly transversely ribbed and swollen; the next whorl is a little smaller than the second, and takes on the normal characters of the shell; sculpture consisting of two principal nodulated spirals with a smaller undulated thread between them, and a still smaller waved thread in front of and marking the suture; the transverse sculpture consists of concave waves (20–23) under the spirals, which cross the whorls but are not conspicuous; base smooth or radiately striate, somewhat concave, bounded by a small double keel of two threads which are covered up in the suture; canal strong, short, wide, twisted; aperture squarish, small; sides of the shell flattened, the sutures not conspicuous. Max. lon. of shell, 9.75; of last whorl, 2.5; max. lat. of shell, 2.25 mm.

Habitat. Barbados, 100 fms.

This shell was found mixed with *C. crystallina*, from which it was easily picked out, owing to its straighter sides, brown color, less rounded base, and turban-like nucleus.

Cerithiopsis Martensii n. s.

Plate XX. Fig. 2.

Shell slender, thin, whitish, elongated, truncated, sharply but not strongly sculptured; remaining whorls about thirteen in number; transverse sculpture of well marked lines of growth curved backward, toward the middle of the whorl, most strongly in the later whorls; also of (on the last whorl about twenty-four) ill defined riblets extending across the whorl; spiral sculpture composed of the usual anterior marginal thread, and two others of which the anterior is the strongest; these rather poorly defined threads rise over the transverse sculpture, but are rarely nodulous, though raised at the intersections; suture moderately distinct; base hardly flattened, with well marked striæ of growth, but no spiral ridges; canal short; aperture more rounded than in the last species. Lon. of shell, 11.25; of last whorl, 3.0; lat. of last whorl, 2.75; of spire at truncation, 1.0 mm.

Habitat. Station 5, lat. 24° 15′ N., lon. 82° 13′ W., in 229 fms., bottom temperature 49°.5. Gulf of Mexico, in 1181 fms., mud, a worn specimen, U. S. Fish Commission.

I take much pleasure in dedicating this neat little species, agreeing with no other in the collection, to Dr. E. von Martens, the distinguished and erudite conchologist of Berlin.

The character of the sculpture of this species is quite close to that of *Cerithiella metula*, but that shell is proportionally less cylindrical, much wider, larger, and stronger. Whether the more slender species will agree with Lovèn's type in their dentition remains to be seen. There is nothing in the shell of any of them to separate them from *Cerithiopsis*.

Cerithiopsis acontium n. s.

Shell small, dark brown, columnar, with sixteen whorls beside the nucleus. Whorls flattened, with three nodulous spirals, of which the middle one is most prominent, crossing about twenty narrow straight transverse riblets, extending from suture to suture; base marked by an untubercled keel which is buried in the suture, remainder flattened-concave with radiating striæ; canal short, recurved; aperture small, squarish, simple. Lon. of shell, 8.0; max. lat of shell, 1.4 mm.

Habitat. Barbados, 100 fms.

The specimen has lost the nucleus, which appears to have been styliform or elongated. It recalls *C. abrupta* in the general features of color and sculpture, but is immediately differentiable by its straight-sidedness, particular sculpture, and different nucleus and base. The interstices and sutures are deep, the base concave, and the canal very short but distinctly twisted. It would not be a *Metaxia*.

Section METAXIA Monterosato.

Cerithiopsis metaxæ Della Chiaje.

Murex metaxa Della Chiaje, Mem., III. p. 222, pl. xlix. figs. 29–31, 1829.

Cerithiopsis metaxæ Jeffreys, Brit. Conch., IV. p. 271; V. p. 217, pl. lxxxi. fig. 4 (P. Z. S. 1885, p. 61, *ex parte*). Watson, Linn. Soc. Journ., XIX. p. 94, pl. iv. figs. 10, 10 a, 1885.

This species, which inhabits the British Isles and extends thence to the Canaries and the Mediterranean, was found by the Blake at Station 20, in 220 fms., and has recently been collected by the U. S. Fish Commission on the coast of North Carolina, and by Hemphill at Key West in Florida.

Cerithiopsis metaxæ var. **tæniolata** Dall.

A very beautiful variety, if indeed it be not a distinct species, was obtained at Stations 2612, 2615, and 2619 by the U. S. Fish Commission, off the Carolina coast, in 15–52 fms.

In general it resembles the *C. metaxæ*, but the longitudinal ribs are stronger than the spirals, — there are about a dozen of them as against twenty-five in *metaxæ*, — the shell is translucent white with a single narrow brown band appearing in the interspaces between the ribs just in front of the suture; the whorls are shorter, rounder, and less scalar than in *C. metaxæ*, and the four nuclear whorls are dark brown, forming a styliform dark tip to the shell, with a sudden change to the normal color at the junction. The sculpture of the nucleus is composed of concave transverse narrow ripples regularly and closely set, and one or two peripheral fine lines, all of which it requires a good glass to observe. In *C. metaxæ* I find the elongated nucleus white and merging insensibly into the rest of the shell, while in the present variety, which I propose to name *tæniolata*, the nucleus appears to be composed of a totally different sort of shelly matter from the adult portion. The specimens average smaller and more slender than *C. metaxæ* of the same number of whorls, and the spirals are rounder and the interspaces less channelled than in most specimens of that shell.

In examining the specimen referred to by Dr. Jeffreys as presented to him by De Stefanis from the Bay of Naples (P. Z. S. 1885, p. 61, line 18), I find that it is an individual of the form called *Bittium abruptum* by Mr. Watson, and another tip referred in the Jeffreys collection to "*C. angustissimum* Forbes, Jr.," shows the characteristic apex of *C. abruptum*. It is from Tunis, and was dredged by Captain Nares, in 50–100 fms.

Cerithiopsis abrupta Watson.

Plate XX. Fig. 5.

Bittium abruptum Watson, Linn. Soc. Journ., XV. p. 119, 1880; Rep. Chall. Gastr., p. 551, pl. xli. fig. 4, 1885.

Habitat. Barbados, 100 fms. Gulf of Tunis, 50–100 fms., Nares. Gulf of Naples (Stefanis), Jeffreys.

This closely resembles *C. metaxæ*, and is distinguishable by having a low rather large nucleus of two whorls, which has at first a decollate appearance. The shell is on the whole smaller and more slender than the genuine *C. metaxæ*, and has, in the specimens I have seen, one less spiral thread than *C. metaxæ* of the same size.

It seems to me, in the absence of any data as to the soft parts, that this species is better placed next to *C. metaxæ* than anywhere else.

Family CERITHIIDÆ.

The genus *Bittium* was mentioned in my Preliminary Report, but further study and better material show that the supposed *Bittium yucatecanum* belongs to Semper's genus *Mathilda*. Of genuine *Bittium* within our region, *Bittium alternatum* Say (as *Turritella*) is better known as *B. nigrum* Totten or *Cerithium Sayi* Menke. This creature has a short contractile muzzle, and a narrow, medially grooved, anteriorly truncate foot, like the true Cerithia to whose family it belongs. I have been somewhat surprised to find that all the specimens in the National Museum belonging to this species come from between Cape Cod and Sandy Hook. All the specimens marked *B. nigrum* from south of the harbor of New York, beginning with those from Crisfield, Md., are of another species, *B. varium* Pfr. The latter, rather small at the north, southward grows larger as the climate becomes more congenial, and its variety *pallidum* of Pfeiffer includes several later synonyms. It has been rather widely distributed as *B. gibberulum* C. B. Adams, and belongs to the section *Diastoma* of Deshayes.* Closely related to these shallow-notched Bittiums are the *Rissoa tervaricosa* and (its variety) *melanura* of C. B. Adams, which have been referred to *Alaba*. Whether congeneric with the original *Alaba* A. Adams, I have not the material for determining; but they differ from *Bittium* in having the notch nearly or quite obsolete, more delicate sculpture, and the nucleus more slender and with more whorls. *A. tervaricosa* C. B. Adams is found in South Florida and the Antilles. A typical specimen of *A. melanura* differs only in having the nucleus dark colored, a variable character.

A. Adamsi Dall is a smaller species, opaque white with usually a brown tint on the early whorls; an anteriorly rounded aperture; about nine rounded whorls ; an acute nucleus and subreticulate sculpture, the spirals being stronger than the transverse waves or threads. It is found from Hatteras southward; it has few varices, an imperforate base, and not a trace of a notch or truncation anteriorly. A still smaller form, *A. cerithidioides* Dall, is distributed through about the same range. It is much more elegant in appearance than the others, though only three millimeters long and one and a quarter in diameter. The shell has an acute nucleus of three and a body of seven whorls, which are translucent with delicate brown painting. The nucleus is pale and glassy; the early whorls have one or two well marked peripheral threads, the later ones have spiral threads in front of the periphery and on the base. The transverse sculpture which crosses the whorls is composed of fine regular even elegantly concavely arched riblets, to the number of at least thirty; these become obsolete on the rounded base, and there is a minute chink or even a perforation behind the pillar, and a patulous suggestion of a notch at the anterior margin of the aperture. The shell suggests a minute *Cerithidea* which has not begun to form its lip, and is one of the most elegant of our minute species. It has only one faint varix.

The genus *Mathilda*, which might be placed in a variety of situations systematically, and which is to some extent recalled by these little shells, I have placed provisionally next to the *Turritellidæ*.

A list of the species of *Cerithium*, positively identified as from this region, from the collection of the National Museum, may be useful, omitting reference to subdivisions and most of the synonyms.

We have our largest and most distinct American species in the *C. floridanum* of Mörch, which extends its range from Cape Fear, North Carolina, to Cuba; *C. algicola* C. B. Adams, is found from South Florida to Jamaica; *C. uncinatum* Gmelin (*fide* Tryon), from the Florida Keys to the Bahamas and Eastern Antilles; it is frequently called *atratum* Born, and *antillarum* Dkr. *C. eburneum* Brugière extends throughout the Bahamas and Antilles; *C. literatum* Born, and its variety *semiferrugineum* Lamarck, from Florida southward. *C. muscarum* Say, inhabits the north shores of the Gulf of Mexico, West Florida, and southeastward to Jamaica; *C. variabile* C. B. Adams (+ *C. ferrugineum* Say, non Brugière, *C. versicolor* C. B. Adams, non Philippi, etc.), Florida and the Antilles. *C. minimum* Gmelin (+ *C. nigrescens*, *septemstriatum*, etc.) I have not seen from north of Florida, but it is common in the Antilles and on the Bahamas. It has been reported from Georgia, but this remains unconfirmed, though it reaches Venezuela. There is a species of *Vertagus*, like *V. Kochii*, in the National collection, which was collected at Barbados in 1864 by Lieut. Fitzgerald. *C. Rawsoni* Krebs is a peculiar, nearly smooth, variegated species, which looks remarkably like a small *Buccinum hydrophanum*. It is found in the salt lagoons of the Bahamas. There are a number of other species, like *C. Sagræ* Orbigny, which are known to inhabit the Antilles, and a vast number of synonyms for the species I have already cited, but I refer only to species which I have confirmed by satisfactory series of specimens to have come from the region.

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* *Diastoma* was considered a Rissoid by Deshayes. I cannot doubt its pertinence to this group of *Bittium*, which can hardly be separated by the shell from *Alaba*.

In *Cerithidea* there are five or six well marked species known from this region, and several doubtful species. *C. costata* Wood extends from West Florida to the island of Jamaica; *C. scalariformis* Say, from Georgia to Key West; *C. varicosa* Sowerby has been received from Texas, Cuba, and Jamaica; *C. turrita* Stearns, from West Florida and the Bahamas; *C. tenuis* Pfr., or *ambigua* C. B. Adams, is a common species in the Bahamas lagoons, and has been received from Jamaica. *C. scalata* Heilprin has been collected at Egmont Key and Stump Pass, on the west coast of Florida, but it is not certain that the specimens were recent. It was described as a Pliocene fossil from South Florida.

Family VERMETIDÆ.

Genus **SILIQUARIA** (Brugière) Lamarck.

Tenagodes Fischer, *Tenagodus* Guettard, etc.

As Guettard did not adopt the Linnean nomenclature, there is no occasion for uprooting a name, like *Siliquaria*, which has been familiar to naturalists for a century.

There are two species of this genus in the Antilles, which come from deep water, and one, *S. ruber* Schumacher, which appears to inhabit the shores, near or not far from low-water mark. The latter species was not collected by the Blake, but may be recognized by its slit, largely undulated so as to present the appearance of a chain.

Siliquaria squamata Blainville.

Siliquaria squamata Blainv., Dict. Sci. Nat., XLIX. p. 213; Mörch, Malak. Blätt., XXIV. p. 110, 1877.

Habitat. Off Havana, in 80–163 fms.; Barbados, 100 fms.; Stations 72 and 292, at Barbados, in 76 and 56 fms.; Station 127, off Santa Cruz, in 38 fms.; and Station 203, near Martinique, in 76 fms.

These mollusks are said to live in sponges, but those above noted certainly showed no signs of such a habitat. Only one specimen showed any signs of annulation along the slit, and in that the appearance was confined to the part of the slit near the apex, which had long been closed. The shell in perfect condition should have nine squamous carinæ, the scales being vaulted or folded into tubes. The most perfect spires I have seen showed no sign of a regularly spiral nucleus. Some of the deep-water specimens are white and striated, the scales nearly obsolete, and the shell extremely thin; but the ordinary form is pale brown, darker along the edges of the slit, which always opens downward. The soft parts had disappeared from all the specimens I have seen.

Siliquaria modesta Dall.

Plate XXVI. Fig. 4.

Siliquaria modesta Dall, Bull. M. C. Z., IX. p. 39, 1881. Agassiz, Three Cruises of the Blake, II. p. 71, fig. 296, 1888.

Habitat. Off Havana, 80–150 fms.; Station 2, 805 fms.; Station 9, 125 fms.; Station 20, 220 fms.; Stations 132 and 136, near Santa Cruz, 115 to 508 fms.; Station 177, off Dominica, in 118 fms.; Station 206, near Martinique, in 170 fms.; Station 231, off St. Vincent, in 95 fms.; Station 241, in 163 fms., near Curaçoa; Station 248, off Grenada, in 161 fms.; Station 276, at Barbados, 94–100 fms.; Gulf of Mexico, in 163–169 fms., mud, U. S. Fish Commission. Total range, 94–805 fms., mud, sand, or coral bottom, with a bottom temperature of 40° to 65° F.

This species is always small and white, has only incremental sculpture, has the slit usually annulated except at the anterior extremity, and shows no sign of a regularly formed spiral nucleus.

Genus VERMICULARIA Lamarck.

Vermicularia Lam., Prodr., p. 78, 1799; Système des An. s. Vert., p. 97, 1801.

The genus *Vermetus* of Adanson, not being proposed in Linnean nomenclature, would have no claims to be retained had it not been emended and adopted by other naturalists. If we are to adopt names proposed by naturalists who did not use binomial nomenclature, there are other names for these shells proposed by Grew, Lister, Klein, Browne, and others, anterior to that of Adanson. However, not to go into the briery nomenclature of this group, it is sufficient to say that the first scientifically to name the genus, and a type for it, was Lamarck, in 1799. The *Vermetus* of early authors is generally an absolute synonym of Lamarck's *Vermicularia*, but more lately the name has been retained to contain those *Vermetidæ* which have internal laminæ projecting from the sides of their tube.

The most common species of our coast belongs to the original group, for which it served as a type.

Vermicularia lumbricalis Linné.

Serpula lumbricalis Linn., S. N., p. 1266.
Vermicularia lumbricalis Lamarck, Prodr., p. 78, 1799; Syst., p. 97.
Vermetus lumbricalis Lamarck, An. s. Vert., VI. Part II. p. 225, 1822.

Habitat. Station 10, in 37 fms.; off Havana, in 175 fms., Sigsbee; Station 127, near Santa Cruz, in 38 fms.; Station 36, in 84 fms., Gulf of Mexico. Northward to New England.

The turritelliform young of this species are distinguished by their peripheral keel and brown color. The length of the regular part of the coil varies in different individuals. The deep-water specimens are paler and less sculptured than those from shallow water.

Vermicularia ? nigricans Dall.

Vermetus lumbricalis var. *nigricans* Dall, Hemphill's Shells, Proc. U. S. Nat. Mus., VI. p. 334, 1883.
? *Vermetus irregularis* var. Tryon, non Orbigny, Moll. Cuba, I. p. 235, pl. xvii. figs. 16, 18, 1842; nec Mörch, P. Z. S. 1861.
? *Vermetus varians* var. Tryon, Man., VIII. p. 170, not of Orbigny.

Shell, when young, loosely and laxly coiled, except at the extreme tip; longitudinally irregularly ridged, circularly roughened with strong irregular incremental lines. The young are often irregularly reticulated from the two series of lines. The older shell is nearly destitute of the longitudinal lines. The aperture is smooth, sharp-edged, and circular. The interior is of a chestnut or blackish brown brilliantly polished. The exterior is rude, contorted, dark or even reddish brown. The animal is of a dark purple brown, almost black, with reddish dots. It is much like that of *V. lumbricalis* L. in general features, but smaller in proportion to the smaller size of the shell. The operculum is concave, externally smooth and smooth-edged, translucent, and of numerous turns. Average length of adults, the contortions not included, about 100.0 mm.; average diameter of aperture in the adult, 2.0 mm. The operculum is about 1.0 mm. in diameter.

Habitat. West Florida, 2–14 fms.

This is the species forming the so-called "wormrock" of West Florida, or at least all of the "wormrock" which I actually examined. It would seem to belong in the same group with *V. lumbricalis,* but forms much more compact masses, with the upper portions of the tubes parallel to each other and erect, close together, recalling *Tubulipora.* It forms masses which are really as dangerous as coral reefs to boats navigating the shallow water in which they flourish. I observed patches of twenty or thirty feet radius, with the top nearly level and barely dry at ordinary low water. The same species is found in deeper water, but there it is not combined in large colonies, but is clustered in small bunches on stones and shells. The young is sculptured in a way very similar to the two species of Orbigny above cited, and with which it has been erroneously combined. Both these belong to the group with strong internal laminæ; on the other hand, the present species is apparently without laminæ.

I have *Petaloconchus irregularis* Orbigny, from 27 fms., sand, between the Mississippi delta and Cedar Keys, Florida. It is more prone than our species, the laminæ are extremely prominent except near the aperture, and there are three of them. I do not believe it ever stands erect in large masses so as to form "rock" comparable to that of *V. nigricans,* but I have found specimens entangled with the *V. nigricans* in the small scattered bunches. The variations in this group are immense. Many hundred specimens of *V. nigricans* which I have examined are totally devoid of laminæ; in a few, which in their entanglement I cannot distinguish from the others (though they *may* be distinct), I have thought I saw traces, near the apex, of a faint median ridge. However this may be, it is just as well to have a specific name undeniably applicable to our Floridian shell, and the others are in such a confused state that they cannot be safely used. Of course, if it should prove that the faint lamina mentioned is normally present in this species, and is of systematic importance, *V. nigricans* would have to be referred to *Vermetus* proper, as used by Tryon and Fischer.

Genus **VERMETUS** (Adanson) Mörch.

Subgenus PETALOCONCHUS Lea.

Vermetus (Petaloconchus) erectus Dall.

Plate XXXVIII. Fig. 4.

Vermetus erectus Dall, in Agassiz, Three Cruises of the Blake, II. p. 71, fig. 297, 1888.

Nucleus smooth, milk-white, polished, bulimoid, two-whorled; when the irregular growth commences the nucleus may be turned upside down or take almost any other position, most appear to lie on their sides. Early part of the shell prone, irregularly contorted; as the whorls lie, the normal sculpture appears to be a single minutely undulated longitudinal ridge on the middle of the back with a space either side, then four or five similar ridges, parallel, close-set, and becoming obsolete as the tube begins to be erect. Between the longitudinal ridges are, in fine specimens, fine elevated transverse liræ. The sculpture is very variable in strength and often more or less obsolete. When the tube begins to rise vertically it loses all its sculpture except irregular incremental lines, and its calibre perceptibly diminishes. The color is yellowish or grayish white. The height of the erect part is usually about an inch, and the diameter of the aperture 1.75 mm. The greatest diameter of the same tube (distortions apart) would be about 2.0 mm.

Internally, very near the apex, are two laminæ. The right one is large, arched over with a thickened edge, the left one lower, thinner, and overshadowed by the other. Both are subtransparent, with opaque whitish streaks. These laminæ are however very irregular; they seem to be altogether absent in some individuals, and are perhaps sexual. They are obsolete or nearly so in most specimens, and I have had to break many before finding a single perfect example of these appendages. The animal is soft and whitish. I could see no eyes or tentacles. The operculum was translucent, spiral, as large as the aperture, with a smooth flexible edge, the outside concave and polished. Owing to the fact that the last whorl of the operculum seems to cover up the others with its inner edge except toward the centre, it is difficult to ascertain the number of turns. Very few of the numerous specimens contained the animals, many were occupied by parasitic sipunculoids, chætopods of several species, and even crustacea.

This species is usually nearly solitary, or but few individuals are associated in the clusters obtained by the Blake.

Habitat. The Antilles, at Stations 2, 11, 32, 45, 139, 206, 208, 220, 247, 290, and 300, in 37 to 805 fms., on small solid objects, bottom temperature from 40° to 71° F.

The species has not been found northward on the coast of the United States.

Genus BIVONIA Gray.

This group is characterized, according to Tryon and other authors, by a rudimentary operculum, an interior free from laminæ, and a dorsal carina on the shell. It much resembles the cases of some Annulosa, from which it is distinguishable by its less calcareous more porcellanous shell, and usually by its larger size.

In the absence of the soft parts, and with the nucleus lost from the specimens in hand, I refer the following species to this group with some uncertainty, and chiefly on account of the shell structure, which is certainly more like that of *Vermetus* than any of the worm-shells known to me.

Bivonia ? exserta Dall.

Plate XXVI. Fig. 6.

Bivonia exserta Dall, Bull. M. C. Z., IX. p. 39, 1881.

Habitat. Station 20, 220 fms. Off Cape San Antonio, in 1002 fms. Barbados, 100 fms. Off Cape Lookout, N. C., in 31 fms., sand, U. S. Fish Commission.

The figured type is young. The Fish Commission specimen shows that, after the portion annulated like the figure is complete, the sculpture changes; the dorsal carina becomes prominent and notched like the upper edge of an alligator's tail, and projects forward like a spine over the aperture. The rest of the shell loses its sculpture, except incremental lines, the lateral carinæ disappear, but are represented by short spines at the aperture. The shell is of a greenish white.

Family TURRITELLIDÆ.

Genus TURRITELLA Lamarck.

Section TORCULA Gray.

This group is composed of species which have the appearance of the tips of *Vermicularia* before the latter begins to go astray. But the more timid *Torcula* never gets its courage up to the point of departure into devious ways. They are readily distinguished by the excavated appearance of the base and the sinuous outer lip. There are three species on the southern coast of the United States. One is very slender, nearly smooth, and much drawn out. I have never seen more than fragments of it, which came from the coast of Texas and of North Carolina, in 40–50 fms. The others follow in their order.

Turritella (Torcula) exoleta Linné.

Turritella exoleta Linné, Syst. Nat., ed. x., No. 561. Tryon, Man., VIII. p. 205, 1886.

Habitat. West of Florida, in 50 fms.; off Havana, in 80 fms.; off Sombrero, in 54 fms.; Station 152, in 122 fms., off St. Kitts; Station 247, in 170 fms., near Grenada. Coast of Texas and the Florida Keys, 45–80 fms., U. S. Nat. Museum.

This pretty species is rather variable in sculpture at different ages and in different individuals. The apical angle varies slightly, some specimens being more slender than others. The nucleus is dextral and sculptured.

Turritella (Torcula) acropora n. s.

Nucleus white, polished, loosely coiled, small, with about two very rounded whorls. Shell whitish, violet, or pale rose-color, with longitudinal flammules of dark reddish brown, and light colored primary spiral threads articulated with elongated distant brown spots. Whorls about fifteen, those after the nucleus with a distinct median keel and obscure suture, the later ones with less prominent median or perhaps several indistinct keels; the last two whorls less closely coiled in the adult, showing the posterior edge overhung by the preceding whorl at the suture. Sculpture of primary and secondary spirals very close set, the primaries flatter and polished above; the finer or secondary spirals very fine; both have a tendency to articulation, and the epidermis in the interspaces bridges over fine sharp incremental lines. Irregularities of growth sometimes simulate faint longitudinal waves. Base similarly sculptured, slightly excavated, bordered by a rounded not carinated edge; columella thin, arched; outer lip thin, sinuous, subangulate anteriorly; aperture subquadrate, varying with the sculpture and individual. Max. lon. of shell, 31.0; max. lat., 8.0 mm.

Habitat. West of Florida, 14–50 fms.; off Cape San Antonio, 413 fms.; off Sombrero, in 54 fms. Coast of North Carolina, near Hatteras, to the Gulf of Mexico, Texas, and Yucatan, and the Antilles, in 3–73 fms., not living deeper than 25 fms., U. S. Fish Commission. Fossil in Florida Pliocene.

This interesting species is variable in color, and also in the form of the whorls. Sometimes the latter are perfectly flat, at other times rounded. The brown flammulæ are occasionally absent. The striation appears very fine to the naked eye. It is only under a magnifier that the separation into primary and secondary spirals becomes evident. This fine striation will enable the species to be recognized, whatever its color or form, which last, though variable, is not remarkably so. This shell is sometimes bleached pure white, but I have seen no white specimens which were fresh. It is, not rarely, of a delicate rose or violet tint. That what appears to be so common a shell should have gone unnamed until now would be singular, but it has probably been taken by those who have collected it for the tip of a *Vermicularia*, or the young of *T. imbricata* L. Complete and adult specimens are rare, fragments common. I find nothing like it in the monographs.

Section HAUSTATOR Montfort.

Turritella (Haustator) yucatecana Dall.

Plate XXVI. Fig. 3.

Turritella yucatecanum Dall, Bull. M. C. Z., IX. p. 93, 1881.

Habitat. Yucatan Strait, 640 fms.

No other specimens of this interesting species have been received. Its nearest relative would be *T. pagoda* Reeve, from New Zealand.

The only other species of this group, which is known from this region is *T. (Haustator) variegata* Linné, of which the *T. imbricata* is generally regarded as merely a variety. It has been collected in Texas and the Antilles.

Mesalia caribea Orbigny is reported from the Antilles, and has been united with *M. varia* Kiener, of West Africa. I have never seen a specimen.

FAMILY MATHILDIIDÆ.

Genus MATHILDA SEMPER.

In form these shells recall *Bittium* and *Turritella;* they have a blunt apex upon which the little heterostrophe *Adeorbis*-shaped nucleus is set on its edge, and often on one side of the axis. The operculum is said to be multispiral and externally concave, the soft parts are externally not unlike those of *Turritella*, the dentition is unknown.

This group is represented abundantly in the Eocene Tertiary of the Paris Basin. There are a few recent species widely distributed, of which two or three are Mediterranean, and one has been described from the West Indies, by Mörch, under the name of *M. trochlea.* This is bicarinate, and measures only 2.0 mm. long by 0.5 mm. wide.

In the subgenus *Gegania* Jeffreys the shell is more trochoid in form, and the heterostrophe nucleus is sunken, showing only a small part of one of its whorls. His supposition that it is dextral is erroneous, as his typical specimens show plainly.

Mathilda yucatecana DALL.

Plate XX. Fig. 7.

Bittium ? yucatecanum Dall, Bull. M. C. Z., IX. p. 90, 1881.

Habitat. Yucatan Strait, 640 fms. Also at U. S. Fish Commission Stations 2415, in 440 fms., sand, off the coast of Georgia, bottom temperature 45°.6; and 2668, in 294 fms., gray sand, off Fernandina, Florida, temperature 46°.2 F.

Nearly all the species of this genus have a patulous extension of the anterior part of the peristome resembling the obsolete notch of *Bittium.* The absence of varices, and, when not decollate, the heterostrophe nucleus asymmetrically set on edge, are distinctive characters. There are some features strongly suggesting relations with *Triptychus.*

Mathilda (elegantissima var.?) barbadense DALL.

Plate XXVI. Fig. 10.

Shell resembling *M. elegantissima* Costa, but proportionally more elongated, with a nucleus only about one fourth as large as that of the Mediterranean species; with the peripheral spiral so large and sharp compared with the others as to carinate the whorls; and with the disk of the base covered with small spirals and proportionally smaller. Shell brownish with seven whorls, exclusive of the nucleus, the anterior edge of the peristome somewhat produced, columella simple without any chink behind it. Max. lon. of shell, 6.2; of last whorl, 2.7; max. lat. of shell, 2.5 mm.

Habitat. Barbados, 100 fms.

This is perhaps a variety of *elegantissima*, but I doubt their identity.

Mathilda Rushii Dall.

Shell white, seven-whorled, with the transverse sculpture stronger and sharper than the spirals; consisting of elevated thickish sharp-edged lamellæ like those of some *Scalæ*, the edges of which rise above the whorl, and cross it from the suture to the margin of the basal disk, the surface of which is nearly smooth. The whorls are somewhat shouldered by an obscure spiral, in front of which are three others; the space between the first and second is slightly greater than that which separates the others. The spirals are indicated rather by nodulation of the edges of the lamellæ than by any positively raised thread under them, except on the last whorl. Columella thin, arched, mouth rounded, base flattened on the disk, imperforate, nucleus small, lucid. Max. lon. of shell, 5.0; max. lat. of shell, 2.0 mm.

Habitat. Bed of the Gulf Stream, in 351–465 fms., Florida Straits, Dr. W. H. Rush, U. S. N. Also off Fernandina, in 294 fms., sand, temperature 46°.3, U. S. Fish Commission.

This pretty little species has a particularly sharp-edged surface, recalling the laminæ on the surface of a file. It looks very much like an *Acrilla*, except for the nucleus and the subangular aperture. Some specimens show one or two old apertures, like varices, projecting above the other sculpture.

Mathilda scitula Dall.

Shell light brown, eight-whorled, beside the nucleus, which is large, helicoid, and of two or three whorls; including the carina of the basal disk there are five spirals; counting forward from the suture on the last whorl, No. 1 is of moderate size and nodulous; No. 2, very fine and undulated; No. 3, strongest of all, and evenly nodulous; Nos. 4 and 5 are smaller, subequal, and nearer each other than No. 4 is to No. 3; the basal disk is flattened-concave, with curved radiating incremental lines, and fine spiral threads, of which one near the pillar and one near the carina are larger than the others; the carina is buried in the suture as the shell grows, above it the surface of the whorls under the spirals is crossed by numerous strong narrow elevated lamellæ, the interstices of the reticulation thus formed being deep and squarely cut. The aperture is nearly square, except as modified by the sculpture; the peristome is thin, the pillar thin, simple, and somewhat reflected. Max. lon. of shell, 5.25; of last whorl, 1.8; max. lat. of shell, 1.7 mm.

Habitat. Off Cape Hatteras, in 49–63 fms., sand, at U. S. Fish Commission Stations 2595 and 2596, bottom temperature 75°.0 F.

This is more slender and elongated than either of the other species, and its sculpture is different. It has a larger and more globular nucleus than *M. barbadense* or *M. yucatecana*, though both of these are larger shells. It is perhaps most nearly related to *M. sinensis* Fischer, which it resembles in general form though not in the minor details of sculpture. In *M. scitula*, sculpture aside, the whorls are rounded and the sutures distinct; there is no trace of any umbilicus.

Subgenus GEGANIA Jeffreys.

Gegania Jeffreysi Dall.

Shell white, four-whorled, with the nucleus immersed in the coil of the first dextral whorl; sculpture like that of *G. pinguis* Jeffreys, reticulate, with three or four strong spirals, as many finer intercalary ones, and numerous fine transverse threads, strongest behind the periphery. Whorls full and rounded, suture distinct; base a little flattened, with six or seven primary spirals; perforate; the aperture rounded, effuse at the end of the straight thin slightly reflected pillar; outer lip thin. Alt. of shell, 5.0; max. lat. of shell, 3.0 mm.

Habitat. U. S. Fish Commission Station 2668, off Fernandina, Florida, in 294 fms., sand, temperature 46°.3 F.

This is proportionally more elevated and slender than *G. pinguis*, which also has the umbilicus open when young. It is probably closed in both when adult, the present specimen being not fully grown. *G. pinguis* also has the whorls more angulate, the aperture more effuse in front, and is a larger and frailer shell. Both suggest *Trichotropis* by the shell characters, except as to the nucleus.

Family SEGUENZIIDÆ.

Genus SEGUENZIA Jeffreys.

Seguenzia Jeffreys, Proc. Roy. Soc. p. 200, 1876.

Seguenzia ionica Watson.

Seguenzia ionica Watson, Lin. Soc. Journ., XIV. p. 589, 1879; Dall, Bull. M. C. Z., IX. p. 48, 1881; Watson, Chall. Rep. Gastr., p. 107, pl. vii. fig. 3.

Habitat. Station 33, in 1568 fms.

Of the fragments referred to this species in 1881, one proves to belong to *B. alta* Watson, and the other went to powder while being transferred from one tube to another. There can be no doubt, however, as to the correct identification of the last mentioned.

A specimen of *S. trispinosa* Watson was dredged by the U. S. Fish Commission in deep water off the east coast of the United States, south of Hatteras; but the label showing the exact locality was unfortunately lost before the bottle containing it reached my hands.

Seguenzia monocingulata Seguenza.

Seguenzia monocingulata Seguenza, Bol. Com. Geol., VII. p. 188, May, 1876; Watson, Chall. Rep. Gastr., p. 105, 1886.

Seguenzia formosa Jeffreys, Rep. Valorous Cruise, June 15, 1876, p. 200; Dall, Bull. M. C. Z., IX. p. 47, 1881.

Seguenzia formosa and var. *nitida* Verrill, Conn. Acad. Trans., VI. p. 186, pl. xxxi. figs. 14, 14 a, 14 b, May, 1884.

? *Seguenzia eritima* Verrill, *loc. cit.*, VI. p. 189, pl. xxxi. fig. 15.

Habitat. Station 16, 292 fms.; Station 20, 220 fms.; Barbados, 100 fms. Off the Florida coast, in 205 fms., Dr. Rush.

In examining the specimens of Seguenzia in the Jeffreys collection, including types of Seguenza's "*Trochocochlea monocingulata*," as well as specimens obtained by the Blake and the U. S. Fish Commission at various points, I find myself in a dilemma. Either each separate individual is to be regarded as a species, or the variability of the shells is very great. Persistent study of the specimens has convinced me that the latter is the true solution, and that the most evident characters, such as the umbilicus (in some adult specimens) may be present or absent; that the number of spiral threads, their strength and sharpness on the basal disk, are entirely inconstant, and, while in the typical *formosa* the ridge next to the suture is waved or granulate, in many it is perfectly plain.

It is for this reason, and having several specimens apparently intermediate between the type and the form named *eritima* by Prof. Verrill, that I have been led to suggest their identity, though I have not seen Prof. Verrill's types. In any case, his name would hold for a well marked variety.

Family TRICHOTROPIDÆ.

Genus **TRICHOTROPIS** Sowerby.

None of the typical forms of the genus are found in the tropics. The degree of affinity which *Mesostoma*, *Dolophanes*, etc. bear to the original type of the family yet remains to be determined.

Subgenus MESOSTOMA Deshayes.

Mesostoma Desh., An. s. Vert. Bas. Paris, II. p. 416; 1st sp. *M. pulchra* Desh., *loc. cit.*, pl. xxviii. figs. 13–16, 1864. Eocene, Paris Basin.

? *Cerithioderma* Conrad, Journ. Acad. Nat. Sci. Phila., 2d ser., IV. p. 295; sole example, *C. prima* Con., *loc. cit.*, p. 295, pl. xlvii. fig. 30, Feb., 1860. Eocene, Alabama.

It is impossible to say from Conrad's figure whether his *Cerithioderma* is identical with *Mesostoma* Deshayes, or not. There is nothing to separate the two shells as far as the figures go, but Conrad in his diagnosis says of the canal, "beak very short, narrow, recurved." The last epithet will in no wise apply to our shell, nor to Deshayes's *Mesostoma*. I suspect it to be an error, notwithstanding which I prefer not to adopt Conrad's name, which has priority, without inspecting his type if it be accessible.

I have no doubt that the shell about to be described, and most if not all of Deshayes's *Mesostoma* species, belong to the family *Trichotropidæ*, though hitherto placed elsewhere.

Mesostoma migrans Dall.

Plate XXIX. Fig. 8.

Trichotropis migrans Dall, Bull. M. C. Z., IX. p. 71, 1881.

Habitat. Station 36, near Havana, 80 fms., Sigsbee.

So far only the original specimen has turned up, and that does not retain its epidermis.

Genus? DOLOPHANES Gabb.

Dolophanes Gabb, Proc. Acad. Nat. Sci. Phil., 1872, p. 273; Trans. Am. Phil. Soc., XV., Geol. St. Domingo, p. 234, 1873.

This genus was referred to the *Struthiolariidæ* by its author, a reference which has been questioned by all those who have had occasion to refer to it since. The occurrence of a specimen in the Blake dredgings, which, if not identical with Gabb's type is evidently closely related to it, enables me to state that its proper position is probably in this family. Unhappily the operculum and soft parts are wanting, so that I cannot confirm my opinion by reference to the details of its organization. I am inclined to believe that another form, also represented in the Blake dredgings, is a representative of a shell described as a *Melanopsis* by Guppy, which Gabb himself suspected to be closely related to his *Dolophanes melanioides*. All these specimens are fresh, but the slight traces of epidermis which they retain are not of the character of the northern species of *Trichotropis*. Their variations are such that I am led to believe all three may be merely mutations of one specific form. If this be confirmed, the specific name of *capula*, given by Guppy, is the oldest. Whether the differences are sufficient to constitute for *Dolophanes* a rank higher than that of a mere section of the genus *Trichotropis*, a more thorough knowledge of its characters is needed to determine.

Dolophanes (melanoides Gabb var.?) Gabbi Dall.

Plate XXIX. Fig. 7.

? *Dolophanes melanoides* Gabb, Proc. Phil. Acad. Sci. 1872, p. 273, pl. xi. fig. 7; Geol. St. Domingo, p. 235, 1873.

Shell small, thin, white, (epidermis lost,) with rather acute turrited spire and eight whorls; nucleus smooth, polished, somewhat inflated and turned a little to one side; second turn also smooth, all the others strongly sculptured;

transverse sculpture of (on the sixth whorl twenty-six) uniform rounded riblets which fail about the middle of the whorl, but appear from suture to suture across the visible part of the earlier whorls; tabulated posteriorly, showing a small nodule at the angle, slightly waved and oblique; lines of growth obsolete on the base but appearing as rugæ on the siphonal fasciole; spiral sculpture of very fine rounded raised threads, uniform and continuous over the whole surface; aperture simple, slightly channelled in front; outer lip rounded, thin, slightly produced in the middle; inner lip reflected, nearly covering the umbilical chink, polished; a few particles of light yellow fugacious epidermis visible in the chink. Lon. of shell, 9.0; of aperture, 3.75; max. lat. of shell, 4.0 mm.

Station 228, off St. Vincent, in 785 fms., sand and ooze, bottom temperature 39°.0 F. ? Miocene of Santo Domingo, Gabb.

This pretty and peculiar form is named in honor of the late W. M. Gabb, to whom the generic name is due. I cannot be certain without a comparison of specimens whether the present shell is the same as that described by Prof. Gabb, or not. But the figure is so much like our shell that I can hardly doubt they are very closely related, if not the same.

Dolophanes (melanoides var.?) columbella Dall.

Pleurotoma (*Mangilia*) *columbella* Dall, Bull. M. C. Z., IX. p. 60, 1881.
? *Melanopsis capula* Guppy, Quart. Journ. Geol. Soc., XXII. p. 580, pl. xxvi. fig. 14, 1866. Gabb, St. Domingo, p. 235, 1873.

Habitat. Station 20, 220 fms.; off Havana, Sigsbee, 158 fms. ? Upper Miocene, Cumana, Guppy.

Two specimens of this form are in the collection. Guppy's specimen, from the figure, was evidently deformed. These differ from it, due allowances being made for deformity, in being narrower and in the narrow shoulder in front of the suture.

The specimen originally serving as type of *M. columbella* is the roundest, and the groove behind the siphonal fasciole is reduced to a mere chink. In the Havana specimen the chink is considerably larger and the shoulder more prominent. It seems to stand about one third of the way from *D. columbella* to *D. Gabbi.* I cannot be sure, with so little material, but I suspect this gap might be filled up by a graduated series of specimens if we had material enough.

Still, as the forms are not yet connected, and have already been named, it seems best to leave them separate for the present.

FAMILY FOSSARIDÆ.

Genus FOSSARUS PHILIPPI.

The name *Maravignia* given by Aradas and Maggiore has been preferred by some naturalists to that of Philippi, proposed in the same year. I have not yet seen any evidence of priority of actual publication which should oblige us to make this substitution. A name so universally adopted should not be changed without absolutely conclusive evidence.

Of *Fossarus* properly speaking, two species, *F. Orbignyi* Fischer (*F. sulcatus* Orbigny, non S. Wood) and *F. elegans* Verrill (*F. latericeus* Verrill *olim*) are known from the Antilles and the Eastern United States.

Isapis anomala C. B. Adams, was described from Jamaica. We have now to add two small species, which seem to range from Florida to Cape Hatteras, having been obtained off the coast of North Carolina, in less than 100 fms., by the U. S Fish Commission. They appear to belong to the subgenus *Gottoina* of A. Adams, which is described as imperforate, solid, and ornamented with spiral sculpture. I have not seen a typical specimen of *Gottoina*, which, moreover, has not been figured, so I refer these species to it on account of their apparent relation to *Fossarus* and the description of *Gottoina* aforesaid.

Subgenus GOTTOINA ADAMS.

Gottoina bella n. s.

Plate XXVIII. Fig. 10.

Shell small, white, solid, shaped much like *Litorina litorea*, having four and a half whorls and a minute glassy rounded nucleus. Radiating sculpture consisting of fine incremental striæ and occasional irregularities of growth. Spiral sculpture of two sorts; — 1st, fine spiral grooving covering the whole shell evenly and always present; 2d, strong spiral ridges, generally nine or ten on the last whorl, but sometimes smaller and more numerous, sometimes partly absent, sometimes so arranged as to tabulate the part of the whorl next the suture, and almost invariably smaller and weaker as they approach the base and the centre of the base. Suture distinct, not channelled; aperture simple, nearly circular, but the outer margin of its thickened edge angulated at the junction with the body; callus continuous; columella arched, with a small chink, but no umbilicus behind it; this chink varies in size with different specimens. Aperture oblique, its upper margin a little depressed. Alt. 3.5 mm.; max. diam. 3.5 mm.

Habitat. Sand Key, 15 fms.

This pretty little shell sometimes has the raised riblets reddish brown against the waxen white of the rest. The nucleus is smaller and less elevated than in *Fossarus ambiguus*, from which, by the way, Gould's *F. pusillus* does not appear to differ specifically.

March 30, 1889.

I hesitated for some time as to whether this species should be described where I have placed it, or under *Cyclostrema*. In the absence of the operculum and of the soft parts, it is evident that the question as to its proper classification can only be decided provisionally, and with due reserve.

Gottoina compacta n. s.

Plate XXVIII. Fig. 6.

Shell small, white, compact, elevated, spirally sculptured, of about four and a half whorls including the nucleus; outline of the spire convex with hardly any rounding in of the whorls toward the suture, which is nevertheless distinct and finely channelled. Radiating sculpture none, lines of growth not visible; spiral sculpture of fine, close, even, rounded threads, growing gradually smaller from the suture forward; there is no secondary grooving; there are about twenty-five threads on the last whorl, but they vary in number and strength with the individual specimen; base full and rounded, imperforate; aperture rounded, pointed behind, and the angle filled with callus; callus continuous, thinnest on the columella. Alt. 2.3 mm.; max. diam. 2.0 mm.

Habitat. Off Havana, in 84 fms., Sigsbee. Off the coast of North Carolina, U. S. Fish Commission, at Stations 2595, 2596, and 2612.

Family SOLARIIDÆ.

Genus FLUXINA Dall.

Fluxina Dall, Bull. M. C. Z., IX. p. 51, 1881.

Fluxina brunnea Dall.

Plate XXII. Figs. 6, 6 a.

Fluxina brunnea Dall, Bull. M. C. Z., IX. p. 52, 1881.

Habitat. Station 2, in 805 fms.; Sigsbee, off Havana, in 80 fms.; both dead specimens.

A careful examination of the nucleus in these specimens indicates that it is sinistral and immersed as in other *Solariidæ*.

An examination of the data relating to the section *Episcynia* Mörch, which has a dextral nucleus, leads to the impression that it does not belong in this family, but perhaps near *Adeorbis*, or a *Vitrinella* like *multicarinata;* at least I can discover no Solariid characters in figure or description.

Fluxina discula n. s.

Plate XXIII. Figs. 5, 6.

Shell small, whitish, polished, of about five whorls, the base of the immersed nucleus looking exactly like a dextral nucleus; surface marked by the fine flexuous incremental lines, which do not interrupt the polish, and by faint occasional indications of spirals; upper surface of the whorls concave near the sutures, elsewhere flattened, so that the sutural junction is slightly elevated; periphery sharply carinated, base moderately rounded, not impressed near the carina; umbilicus moderate, scalar, its walls smooth and vertical; umbilical margin carinate, an impressed line just outside the carina; aperture wide, margins thin, columella straight, a little thickened, a wash of callus on the body; apparently little if any notch at the end of the umbilical carina. Max. diam. 6.5; min. diam. 5.5; alt. 3.0 mm.

Habitat. Off Dominica, at Station 180, in 982 fms., fine brown ooze, bottom temperature 39°.7 F.

This little shell differs from the type of the genus in its want of color, and its scalar instead of funicular umbilicus. It resembles a smooth depressed *Basilissa* in its general aspect, but is not nacreous, and the flexuosity of the margin of the mouth is that of *Fluxina* rather than of *Basilissa.*

Dr. Paul Fischer has placed the *Solariidæ* in the Tænioglossate division of the Gastropods, rather than with the *Ptenoglossa.* This arrangement seems more satisfactory than the old one on several accounts, though the question is beset with difficulties, chief among which is our ignorance of the real characters of the great majority of mollusks, a fact which most systematists are only too ready to overlook. In revealing the Tænioglossate character of *Seguenzia*, Prof. Verrill has done excellent service, though I should be disposed to approximate the family to which *Seguenzia* belongs to the *Turritellidæ,* rather than to forms like *Aporrhais.* A short-conic partly nacreous *Turritella* would be very close to *Seguenzia*, many species exhibiting similar flexuosities about the margin, while others, like *Tachyrynchus*, show traces of a canal, and still others marginal sulci. There is no assemblage of species, however, if we include the small trochiform tropical species which have been referred to so many groups and mostly are not known positively to belong to any, which will better repay thorough investigation than those forms which have been referred to the *Solariidæ.* Until they have been so investigated, all our classification of them is and will remain unsatisfactory and provisional.

Genus SOLARIUM Lamarck.

Solarium granulatum Lamarck.

Solarium granulatum Lam., An. s. Vert. (ed. Desh.), IX. p. 98. Sby., Thes. *Solarium*, No. 8, figs. 1, 2.

Solarium nobile (Bolten) Hanley, Sby., Thes. *Solarium*, fig. 35, p. 230, No. 7, 1866.

Solarium verrucosum Philippi, Zeitschr. Malak., 1848, p. 72. Sby., Thes. *Solarium*, fig. 35.

A single broken specimen was dredged off Sombrero, in 54 fms.

The East and West American forms differ very slightly. If the specimens were found in the same waters, no one would think of distinguishing them by different names.

Solarium peracutum n. s.

Plate XXXIII. Figs. 2, 5.

Shell whitish or yellowish, thin, very depressed, conic, extremely sharply keeled at the periphery; sculpture faint, base rounded, excavated just within the periphery; umbilicus large, scalar, the walls in each whorl deeply concave, bordered below by a very strong nodulous rib, terminating in a sulcus at the base of the columella. Nucleus sinistral, immersed, whorls six or seven without the nucleus; sculpture above consisting of numerous radiating somewhat flexuous fine incremental lines crossed at the periphery by one strong flattened spiral thread, nodulous on the earlier whorls and articulated faintly with yellowish brown. Inside this is a much finer simple spiral, and within this again another large one, also nodulous on the early whorls. Hence to the suture are four or five smaller flattened spirals, uniform, but fainter on the later whorls and separated by somewhat wider faintly but distinctly channelled interspaces. Periphery of the shell brought to a thin but rounded carinal edge, which is however about the sharpest of any known in the genus. Base sculptured by numerous fine spirals, by strong but irregular radiations from the umbilical margin, which is marked on its edge with about 22 strong nodules, and bordered by two grooves enclosing a wider subnodulous spiral space, becoming less marked with age. Columella short, thickened, with a sulcus at its base; basal margin thickened near the sulcus; the remainder of the apertural margin thin and sharp, the aperture itself almost triangular. Max. diameter of shell, 17.5; min. diam., 15.0; altitude, 6.0 mm.

Habitat. Barbados, 100 fms.; Station 290, off Barbados, in 73 fms., coral and shell, bottom temperature about 71°.0 F.; Station 128, off Frederikstadt, in 180 fms., gray ooze, bottom temperature about 60°.0 F.

This species does not much resemble any of the living forms. It is most like *S. hemisphericum* Seguenza, a fossil from the Tertiaries of Messina. This has the same form, except that it is sub-excavated above near the periphery as well as below. The details of sculpture differ considerably, but the inconspicuous character and slight prominence of the sculpture is much the same in both. The fossil has a much smaller umbilicus, and the rib about it is feebly marked, though the edge is nodulous.

Solarium Sigsbeei n. s.

Plate XXIII. Figs. 3, 3 a.

This shell was supposed at first to be the young of *S. peracutum;* further study and comparison with young specimens of the same size show that, though related, they are not identical. The sculpture is much more prominent and granular, the whorls are more elevated and much less discoid. The details of sculpture are also quite different, as will be seen by the figure. The color is pale yellowish or waxen. Max. diameter of the shell figured, 5.5 mm.; altitude, 2.3 mm.

Habitat. Off Bahia Honda, Cuba, at Station 19, in 310 fms., one specimen.

The other recent species most like this is the *S. borealis* of Verrill, in which the sculpture of the umbilical margin is wholly dissimilar, and quite faint in comparison.

Genus **OMALAXIS** Deshayes.

Omalaxis Deshayes, Encyc. Méth., Tabl., 1830. (*Solarium bifrons* Lamarck.)
Omaloxon (Desh. em.!) Agassiz, Nomenclator Zoöl., 1846.
Omalaxon (Agassiz em.) Herrmannsen, Ind. Gen., II. p. 144.
Omalalaxis (Desh.?) Herrmannsen, *loc. cit.*, p. 144.
Bifrontia Deshayes, Encyc. Méth., III. p. 659, 1832. Lam., Hist. An. s. Vert., IX. p. 103.
Orbis Lea, Contr. to Geol., p. 123, 1833. (*O. rotella*, pl. iv. fig. 112.)
Discohelix Dunker, Pal., p. 132, 1849; Handb. Conch., p. 500.
Homalaxis (Desh. em.), Fischer, Manual, p. 715, 1885.
Homolaxon (as of Agassiz) Watson, Chall. Rep. Gastr., p. 137.
Not *Omalaxis* Tryon, Syst. Conch., II. p. 219 (? = *Adeorbis*).

The above partial list of synonymy gives a pretty fair idea of what happens when authors take it upon themselves to modify generic names in the supposed interest of grammatical accuracy. Unless there is a palpable typographical error, or the form of the word is essentially incompatible (apart from its meaning) with a Latiniform nomenclature, there is no sufficient reason for reforming it. It is of no consequence whatever, that *Omalaxis* is erroneously constructed. It is of serious consequence that the nomenclature of biology should not be burdened with eight or ten unnecessary synonyms.

Omalaxis is divided by Dr. Fischer. *O. zanclea* Philippi, which has a *Torinia*-like operculum, is placed under *Torinia* with the name of *Pseudomalaxis* (possibly identical with *Ilaira* H. & A. Adams), while the original name is kept for those having a simple thin operculum of many whorls. To the latter group belongs the following species.

Omalaxis nobilis Verrill.

Omalaxis nobilis Verrill, Third Cat. Moll., Trans. Conn. Acad., VI. p. 423, pl. xliv. fig. 12, 1885.

Habitat. Off Chesapeake Bay, Verrill, in 70 fms. Off Cuba, near Morro Light, in 119–292 fms., Sigsbee; off Sand Key, in 128 fms.; at Barbados, in 103 fms.; and at Station 45, in 101 fms., Lat. 25° 33′ N., Lon. 84° 21′ W., bottom temperature about 62°.0 F.

This species should be compared with *Bifrontia rochettina* Michelotti of the Italian Tertiaries, and with *B.* (*Orbis*) *Pingelii* Mörch (Först Tert. i Dan., p. 24, 1874) from the older sands of Copenhagen, but I have not the specimens accessible for this purpose. The nucleus in *O. nobilis* is sinistral, as in other members of the family, though some care is necessary to observe this, the plane of the shell being very uniform.

FAMILY? ADEORBIDÆ.

Genus SEPARATISTA GRAY.

Section HALOCERAS DALL.

Separatista (Haloceras) cingulata (VERRILL) DALL.

Cithna cingulata Verrill, Trans. Conn. Acad., VI. p. 184, pl. xxxii. fig. 7, May, 1884.

Habitat. Off Nantucket Shoals and George's Bank, on the coast of New England, and 120 miles S. E. from Delaware Bay, in 906 to 1497 fms., sand and mud, at U. S. Fish Commission Stations 2043, 2076, 2084, and 2733, temperature 38°.0 F.

Cithna cingulata Verrill was described and figured from an immature specimen. The adult shell has the form of *Separatista*, is flattened on the upper surface of the whorls, and has a strongly bicarinate periphery, so that the spire is scalar, ending in a dark brown dextral larval shell originally furnished with a spirally fringed epidermis. This nucleus is smooth, but the rest of the shell is strongly spirally grooved, and covered with a light rather fugacious epidermis.

I was unable to extract the animal without destroying the only perfect specimen, but it was of a dark reddish color, and bore a very remarkable operculum of a subtriangular shape not unlike that of *Xenophora*, but laterally elongated, and at the small end of the triangle, which, in the retracted state, is close to the columella, there is a small spiral portion of about 2½ whorls. The general outline is that of a half-open fan rising from a small circle. The exterior of the operculum is roughly lamellose and of a dull brown, like the operculum of *Buccinum,* but less horny and thinner. The only operculum at all similar which I remember is that of *Atlanta*, which, however, is ovate, smooth, pellucid, and dextral. There are certain points about the shell and opercle which recall *Dolium* and *Persona.* The shell is holostomate with the base prolonged at its inner lower angle. The whorls are coiled almost as in *Scala.* The umbilicus is small but deep. An examination of the type of *Separatista* in the British Museum shows that, so far as the shell is concerned, its earlier whorls are not dissimilar to our shell. The latter has the last whorl not separated from its predecessor, but I doubt if this character is of generic value. *Delphinula laxa* Say, referred by Adams to this genus, is doubtless, as suggested by Say, a deformed *Lunatia.* In view of the conchological differences and our ignorance of the operculum and soft parts of the original *Separatista*, I feel justified in proposing a new sectional name for it, as it has nothing to do with *Cithna* properly so called. For the future, then, it may be termed *Separatista* (*Haloceras*) *cingulata* (Verr.) Dall.

Genus **ADEORBIS** Wood.

Adeorbis supranitidus Wood.

Adeorbis supranitidus Wood, Cat. 1842; Crag. Moll., p. 137, pl. xv. figs. 5 a, 5 b, 1848.
Skenea trilix Bush, Trans. Conn. Acad., VI. p. 464, pl. xiv. figs. 7, 7 a, 1885.

Adeorbis supranitidus var. Orbignyi Fischer.

Adeorbis Orbignyi Fischer, Journ. de Conchyl., VI. pp. 173, 286, 1857.
Omalaxis ? *lirata* Verrill, Trans. Conn. Acad., V. p. 529, 1882.
Skenea lirata Verrill, *loc. cit.*, VI. p. 452; Bush, VI. p. 464, 1885.

Habitat. Station 23, off Bahia Honda, Cuba, in 193 fms. Eastern coast of the United States from Florida to Cape Cod, U. S. Fish Commission. Crag of Britain, Wood. Norway, Lofoten Isl., G. O. Sars. Tangier Bay, Porcupine Expedition. Cedar Keys, Florida, Hemphill.

This is a very interesting and variable little shell. The normal form figured by Wood and Bush may be taken as the type, from which we have the following divergent varieties: 1. With one or more of the carinæ missing, sometimes all. When the latter is the case, some fine spiral striæ remain, and we have *A. striatus* Wood. 2. The carinæ may be indefinitely multiplied; those with numerous cinguli on the upper surface and the base normal are *A. lirata* Verrill. Those where the base is also invaded are *A. Orbignyi*. *A. Beaui* Fischer,* which is found in Florida, is a gigantic repetition of *A. lirata*, but they can hardly be united.

Subgenus CLATHRELLA Recluz.

Clathrella Recluz, Journ. de Conchyl., 1864, p. 251.

The difference between the animals described by Recluz shows that *Clathrella* cannot belong to the same group as *Fossarus*, and a careful study of *F. depressus* Seguenza, *fragilis* O. Sars, *reticulata* S. Wood, and *naticoides* n. s., has nearly converted me to Dr. Jeffreys's opinion that they are related to *Adeorbis*, being elevated and turbinate forms of that group. Whether *Phasianema* S. Wood is identical with *Clathrella*, or *Fossarus*, or *Isapis*, I do not feel ready to decide, and leave that question open.

Clathrella naticoides n. s.

Shell minute, white, naticoid, recalling *Lunatia heros* in shape, but with rounder whorls and deeper sutures; whorls four, the nucleus minute, inflated and obliquely set, polished and glassy; remainder of the whorls of a greenish opalescent white, with an unpolished surface; the earlier whorls show minute *Scala*-like transverse ribbing, the later ones are smooth except for silky incremental lines; last whorl much the largest; aperture rounded ovate, margin simple, sharp; columella straight, forming the front edge of a very deep narrow vertically striated umbilicus; umbilicus with a strong serrate carina which does not angulate the margin of the aperture. Alt. 2.75; max. diam. 2.50 mm.

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* This is also named *Cyclostrema bicarinatum* by Guppy, Geol. Journ., XXII. 291, 1866.

Habitat. U. S. Fish Commission Station 2610, off the North Carolina coast, in 22 fms., gravel, bottom temperature 79°.0 F.

This species is related to *A.* (*C.*) *depressus* Seguenza, but has not the beautiful surface shagreening of that species and is rounder, fuller, and generally more compact and naticiform.

FAMILY RISSOIDÆ.

Genus RISSOA FRÉMINVILLE.

A vast number of small shells are included under this genus. Without doubt a reasonable classification of them will render a separation into subgenera and sections advisable and convenient. But many of the attempts to do this have been so bungling, and the naming of subordinate groups has been carried to such an excess, as practically to oblige one who has not especially studied the family either to select unguided from a chaos of names or to fall back upon the original generic name. As I have only two species from the Blake collection to consider, I prefer the latter course. The arrangement adopted by Mr. Watson in the Challenger Report is clear and rational; it is to be hoped that the subject will be taken up by some conservative person, not afraid of drudgery, and permanent order brought out of the present chaos.

Rissoa precipitata n. s.

Plate XIX. Fig. 1.

Shell conical, blunt, thin, translucent or milky-white, with four and a half whorls; nuclear whorl and a half depressed, large, opaque white, smooth, polished; remainder polished, transversely sculptured with about twenty-two close-set well-defined ribs, extending from suture to suture, and on the last whorl to the periphery, beyond which they become obsolete or merge into the lines of growth; just before the suture is an impressed line or constriction, behind which on the later whorls the ribs are nodulous; near the periphery the shell is marked by more or less distinct grooves, and where the intercalary ridges are intersected by the ribs there is often a slight nodulation; these grooves and approximately equal ridges between them are evident over most of the rounded base; aperture rounded in front, angulated behind; pillar with a slight callus and an (accidental?) minute perforation behind it; outer lip thin, simple; suture distinct, not deep. Lon. of shell, 4.0; of last whorl, 3.0; of aperture, 1.8; max. lat. of shell, 2.5 mm.

Habitat. Yucatan Strait, 670 fms., one dead specimen.

This form is related to *R. xanthias* and *pyrrhias* of Watson, from both of which it differs in its white and unsculptured depressed nucleus, as well as in the fine and close character of its sculpture, its larger size, and relatively thinner shell.

The shell is not umbilicated when adult, but either the young shell differs in this character, or there is a variety of the species which has a well marked umbilical furrow behind the outer lip, and wants the spiral grooving on the base, though agreeing with the type in other respects. A not quite mature shell of this description was dredged by Dr. Rush in 498 fms., off Gun Cay, in the path of the Gulf Stream.

Rissoa (xanthias Watson var.?) **acuticostata** Dall.

Plate XIX. Fig. 10.

Rissoa xanthias Watson, Challenger Gastr., p. 588, pl. xliv. fig. 5, 1885.

This form has a yellow nucleus of three whorls regularly conical, and with the last whorl finely spirally grooved and crossed by fine elevated incremental lines. The adult has strong sculpture, fourteen very sharp suturally tuberculated ribs; the whorls spirally minutely striate, with three to five or more stronger threads before the periphery, no umbilicus, and a strong varical rib. Alt. 3.7; lat. 2.0 mm.

Habitat. Off Cape San Antonio, in 640 fms.; Barbados, 100 fms.; Station 20, Gulf of Mexico, in 220 fms. Also at U. S. Fish Commission Station 2117, off Hatteras, N. C., in 683 fms., mud; and Station 2387, in 32 fms., sand, Gulf of Mexico, between the Mississippi delta and Cedar Keys.

Were I convinced that the characters of the nucleus are invariable in this group, I should not hesitate to regard this as a new species. As I strongly suspect they vary, as do the characters of the adult shell, and I have not sufficient material to decide that point, I prefer for the present to regard this as a variety of Mr. Watson's species, from which its apical portion differs in a marked manner.

Among the other species of this genus which have been found in deep water off our coast are *R. pelagica* Stm. (*carinata* Mighels *non* Da Costa *nec* Philippi); a form not named, extremely like *R.* (*Setia*) *australis* Watson; another, *R. arenaria* Mighels, extremely close to *R. castanea* Möller; *R. tenuisculpta* Wats.; *R. deliciosa* Jeffreys; *R. pyrrhias* and *xanthias* Watson; *R. Jan-mayeni* Friele, and its smooth variety *R. brychia* Verrill; *R. syngenes, leptalea, apicina, Sandersoni,* and *harpa* of Verrill; *R. areolata* Stm.; *R. turgida ?* Jeffreys, and *R.* (*Cingula*) *aculeus* Gould.

The proper classification and confirmation of these species must await a larger supply of fresh material, and a thorough revision of the whole group.

Genus RISSOINA Orbigny.

Of this group, so abundant in moderate depths in the West Indies, only a few were collected by the Blake, and these were doubtless adventitious, and were never found living in the region of deep water below the zone of corals.

Rissoina lævigata C. B. Adams.

Rissoina lævigata C. B. Adams, Contr. Conch., p. 114, 1850.

Habitat. Barbados, 100 fms. Northward to the Carolina coast, in 15–22 fms., U. S. Fish Commission.

Rissoina albida C. B. Adams.

Rissoina albida C. B. Adams, Proc. Bost. Soc. Nat. Hist., 1845, p. 6.

Habitat. Barbados, 100 fms. Utilla Island, Honduras, Simpson.

Rissoina decussata Montagu.

Turbo decussatus Montagu, Test. Brit., p. 399, 1803.

Habitat. Florida, Hemphill. Near Cape Fear, N. C., in 17 fms., sand, at Station 2617, U. S. Fish Commission.

Not obtained by the Blake. This is *R. striosa* C. B. Adams, and *R. striatocostata* Orbigny.

Rissoina Chesnelii Michaud.

Rissoa Chesnelii Mich., Descr. Gen. Rissoa, p. 15, figs. 23, 24.

Habitat. Barbados, 100 fms. Florida (Rush and Hemphill) northward to North Carolina, U. S. Fish Commission.

This is *R. Catesbyana* Orbigny, and *R. scalarella* C. B. Adams.

Other species reaching the coast of the United States are *R. bryerea* Montagu (+ *scalaroides* Ad.); *R. multicostata* C. B. Adams; and *R. cancellata* Philippi (+ *pulchra* Ad., and *Philippiana* Pfr.); all of which reach the Florida Keys, while *R. Sagraiana* Orbigny will probably be added to the list, as it is known from Cuba and is in the National Museum from Vera Cruz, Mexico.

Genus BENTHONELLA Dall.

Shell shaped like *Niso*, but without peripheral or umbilical keels; umbilicated; with a regular dextral nucleus of several whorls, of a different color and texture from the succeeding growth; early whorls often slightly transversely ribbed, but, in general, there is no sculpture or but little; peristome slightly reflexed, rounded in front, simple, sharp, not continuous over the body. Surface brilliantly polished and apparently without epidermis.

This group is instituted to contain a few species which I cannot find any place for in existing groups. The soft parts are unfortunately unknown. If Verrill's *Cingula apicina* should belong here, as seems possible, the animal would be blind and the operculum paucispiral; but the nucleus of that species is *styliform* while in all ours it is *trochiform,* and I do not feel confident that they belong together. There are several of the deep-water *Rissoæ* which have a small brown trochiform nucleus, somewhat like the present group; but there is little which can be depended upon in the general character of the larval shell to determine generic or even specific affinities, in the absence of other confirmatory evidence, as a student soon finds out who examines into the matter thoroughly. But neither in *Aclis,* nor in any of the *Eulimidæ,* have I so far discovered any such discrepancy between the material and color of the nucleus and the rest of the shell as is here presented. All the species are very thin.

Benthonella gaza n. s.

Shell elongated, glistening opaque white, extremely thin, with two and a half larval and five later whorls. Nucleus trochiform, brown, polished, with a single carina above the periphery; other whorls full, rounded, the earlier ones marked with a few faint flexuous transverse waves, the rest with only lines of growth. The whorls are full and rounded, the suture distinct; base full, rounded, with a small umbilicus, in front of which is reflected the thin inner lip; aperture rounded, lip slightly reflected, not thickened. Lon. of shell, 6.5; of last whorl, 3.6; max. lat. of shell, 3.5 mm.

Habitat. Station 2352, west of Cuba, in 463 fms., coral, U. S. Fish Commission.

This species may be regarded as the type. Its polished white rounded simple whorls and brown tip present an elegant appearance.

Benthonella Fischeri n. s.

Shell resembling the last, but shorter and more trochiform and with a smaller umbilicus. Nucleus of three brown polished whorls, rather flattened on the apex, and smooth or with two faint carinæ, the lower one against the suture, the other behind the periphery; subsequent whorls four or five, rapidly enlarging, smooth, polished, inflated, with a few small transverse waves behind the suture in some specimens; in the early whorls these waves do not extend back from the suture more than half the width of the whorl, and in other specimens are absent; incremental lines which do not affect the polish of the surface are the only other sculpture; base full and rounded; umbilicus minute, partly but not wholly covered by the reflected inner lip; peristome thin, sharp, broken in all the specimens. Max. lon. of shell, 5.3; of last whorl, 3.2; max. lat. of shell, 3.25 mm.

Habitat. Gulf of Mexico, in 940 fms., mud, bottom temperature 39°.6 F., at U. S. Fish Commission Station 2384, between the delta of the Mississippi and Cedar Keys, Florida.

This shell, though shorter and wider, evidently belongs with the last. It is named in honor of Dr. Paul Fischer, whose admirable Manual is so useful, and in fact indispensable, to all students of mollusks.

Benthonella nisonis n. s.

Shell waxen white, with a (slightly damaged) brown nucleus of (more than two) dark polished whorls and eight adult whorls succeeding the larval ones. The shell is almost exactly the shape of a *Niso*, and if the nucleus were gone would seem to need only the keels to make it one. The whorls are less rounded than in the preceding species, the suture is distinct and slightly appressed. There is no sculpture except that occasionally an emphatic incremental incised line indicates a previous resting stage. Base full and rounded; umbilicus small; aperture beautifully rounded in front, peristome thin, discontinuous, slightly reflected, especially at the inner lip, which is arcuated. Max. lon. of shell, 9.0; of last whorl, 4.6; max. lat., 4.0 mm.

Habitat. With the last, in 940 fms. muddy bottom.

This shell remarkably resembles a *Niso* without keels, and I should not hesitate so to refer it were it not for the nucleus. The figure of *Aclis lata* (Plate XVIII. Fig. 8), if the differences of dimension be taken into account, would pretty fairly represent this shell.

Family CALYPTRÆIDÆ.

Genus MITRULARIA Schumacher.

Mitrularia Schumacher, Essai, pp. 56, 183, 1817.
Calyptræa Lamarck, 1801; not of Lamarck, 1799.

Mitrularia equestris Linné.

Mitrularia Neptuni Schumacher, *loc. cit.*

Habitat. Station 2, in 805 fms, Gulf of Mexico; Station 32, in 95 fms.; Station 155, near Montserrat, in 88 fms.; and Station 273, near Barbados, 103 fms. Northward to Cape Hatteras, in 15–34 fms., U. S. Fish Commission.

This group seems to me decidedly nearer *Crucibulum*, etc., than to *Amalthea,* notwithstanding it occasionally secretes a shelly pedestal.

Genus **CRUCIBULUM** Schumacher.

Crucibulum auricula Gmelin.

Patella auricula Gmelin, Dillwyn's Cat., II. p. 1017, 1817.
Crucibulum planatum Schumacher, Essai, p. 182, 1817.

Habitat. Off Sombrero, in 54 fms. Gulf of Mexico, U. S. Fish Commission. The above is the first specific name in binomial form, and it was applied to the West Indian shell. It should, therefore, take precedence of all others, including that of Gray adopted by Tryon.

Section DISPOTÆA Say.

Crucibulum striatum Say.

Habitat. Northward from Vera Cruz, Mexico, and the Antilles, to Grand Manan Island, Bay of Fundy. Off Sand Key, Florida, in 128 fms.

Genus **CALYPTRÆA** Lamarck.

Calyptræa Lamarck, Essai, p. 78, 1799 (not of Syst., 1801).
Galerus Humphrey, Mus. Calonnianum, p. 5, 1797 (undescribed).

Calyptræa Candeana Orbigny.

Infundibulum Candeanum Orbigny, Moll. Cuba, II. p. 190, pl. xxiv. figs. 28, 29, 1842.
Galerus Candeanus Dall, Hemphill's Shells, p. 335, 1883.
Galerus parvulus Dunker, Jahrb. Deutsch. Mal. Ges., 1875, p. 244.

Habitat. Yucatan Strait, dead, in 640 fms. Province of St. Catherine, Brazil, northward to the Antilles, Florida, and the coast of North Carolina, living, in 12–50 fms.

This species appears never to attain a greatest diameter of over 12.0 mm.; most of the specimens I have seen are less than half this diameter. It is more elevated than *C. chinensis* and the spirality is more conspicuous, while there are numerous strong incremental lines, and an absence of the pustules characteristic of the European species.

Genus **CREPIDULA** Lamarck.

Crepidula Lam., Essai, p. 78, 1799.
Proscenula Perry, Conch., pl. liii. and expl. text, 1811.

In most manuals and books of reference the animals of this family are said to protect their eggs "under the foot" while developing. I have examined *Crucibulum imbricatum* and *Calyptræa conica* Broderip, as well as *Crepidula*

(*Sandalium*) *aculeata* Gmelin and *C. adunca* Sowerby, all of which agree very fairly in general characters. The foot is rather small, with a thin front edge; the neck and muzzle are long, thin, narrow, and vertically compressed, with short stout tentacles, with the eyes about midway from their outer bases toward the tips; behind the right tentacle, and just above the epipodial line, is the slender cylindrical verge, in the male; this organ is sometimes as long as the tentacle, sometimes only half as long, but always more slender. On each side of the neck is a broad thin lamina, extending back to the junction of the neck and foot. This is epipodial in origin, and usually flat or slightly puckered by the alcohol. When the eggs are deposited, they appear in irregular groups, enclosed in pedunculated gelatinous masses (*Crepidula adunca*), or in a single large gelatinous mass. At this time the epipodial lamina on each side becomes enlarged, puffed up like a hood or dome, between its outer margin and the neck, while the corners of the foot project, each in a large thin linguiform flat process. The inner edges of these processes overlap, and form a floor, which is roofed in by the neck with its exaggerated lateral pouches on each side. In this shelter the egg masses are protected (*C. adunca*) until the young are hatched. There is some variation of details in different species, but in general the process is about the same, at least in all I have examined.

The gills in this family are much more like Pelecypod gills than are those of most Gastropods. The laminæ are long, almost filamentous, and sustained by chitinous rods. Their tips are slightly enlarged and opaque whitish, while the rest is translucent. The osphradium, like small short-laminated gill, is situated by the side of the ctenidium.

Section JANACUS Mörch.

Crepidula protea Orbigny.

Crepidula protea Orbigny, Moll. Cuba, II. 192, pl. xxiv. figs. 30–33, 1842; Dall, Bull. M. C. Z., IX. p. 80, 1881.

Habitat. Off Havana, at several stations, varying in depth from 80 to 450 fathoms.

This is probably identical with *C. unguiformis* Lam.

Section SANDALIUM Schumacher.

In adopting the name *Crepidula* of Lamarck, Schumacher divided the group into two genera, each of which contains two sections, in this manner: —

Genus X. *Sandalium* Schumacher.
    Section α, type *Patella porcellana* Lin. (= *Crepidula* s. s.)
    Section β, type *Patella aculeata* Chemn.
Genus XI. *Trochita* Schumacher.
    Section α, type *Patella chinensis* Lin. (= *Calyptræa* Lam., 1799).
    Section β, type *Patella trochiformis* Gmel.

It is evident from the above table that the two previously unnamed sections should bear the names applied by Schumacher, instead of those given to the same things at a later time. Thus the section of *Crepidula*, called *Crypta* (Gray) by Dr. Fischer in his Manual, should take the name of *Sandalium* if the section is to be retained; and the *Trochatella* of Lesson (1830, not of Swainson, 1840) must give way to *Trochita* of Schumacher. In this way only can the rules of nomenclature be satisfied, even if it were not due to the very remarkable ability shown in his system by Schumacher. He was by far the most clear-headed of the early conchological systematists except Lamarck. The reference of this group to the *Infundibulum* of Montfort by several naturalists is an error. Montfort would doubtless have referred a *Trochita* to his genus *Infundibulum;* but his type, distinctly figured and unmistakable, is no *Trochita*, as he recognizes in his remarks, but the shell called *Carinidea* by Swainson, as Dr. Fischer has correctly stated (Manual, p. 817).

Crepidula (Sandalium) aculeata Gmelin.

C. aculeata Gmelin, Tryon, Man., VIII. p. 129, pl. xxxix. figs. 61-65, 1886.

Habitat. Gulf of Mexico, near the Tortugas, at Station 44, in 539 fms., bottom temperature 39°.5 F.

One living but dwarfed and white specimen was found at the above depth. The species extends to Cape Hatteras in a northerly direction, and is abundant below tides on the Florida Keys. It is common in the Southern Pliocene.

Beside the above, *Crepidula convexa* Say and *C. fornicata* Linné enter this region from the north; though I have seen no typical *fornicata* except from the mainland, the variety *C. navicula* Dunker replacing it among the islands. *C. glauca* Say is only a particular form of juvenile *C. fornicata*. There are innumerable synonyms.

Family CAPULIDÆ.

Genus CAPULUS Montfort.

An investigation of the literature in regard to this genus shows how little is known in regard to some of the commonest mollusks, and how necessary to a proper understanding of their relations is a reliable account of their most prominent anatomical features.

In nearly all manuals or works relating to this genus we find the type species *C. hungaricus* Linné represented as having the "rostrum lengthened" (Tryon), "mufle allongé" (Fischer), "head broad and thick with produced lips so as to make the extremity of the muzzle appear cloven" (Jeffreys), and "head snout-like" or with "extensile snout" (Jeffreys). In 1858 Bretherton stated in the Zoölogist, that "the proboscis or rostrum (like that of *Cypræa* it appears to be of an intermediate character) is capable of extension, and can be produced beyond the shell." Troschel states (Gebiss der Schnecken, I. p. 161, 1863) that the external mouth parts exhibit "ein vorstehender rüsselförmiger Theil" which cannot be retracted and extended, and is not a true proboscis. He compares it to an elongated lower lip, and states that it is fissured on the upper side lengthways with a deep incision. Lastly, Gray, in Mrs. Gray's Figures of Molluscous Animals (Vol. III. pl. cclxviii. figs. 12 a, 12 b, from a manuscript sketch by Curtis, cf. Vol. IV. p. 83, 1859), shows a long slender pointed proboscis or tubular unforked organ, protruding from between the tentacles to a distance equal to the whole length of the animal behind the head. Troschel could find no jaws; another authority states that the jaws are rudimentary.

A small specimen of *C. hungaricus*, taken by the Fish Commission off Martha's Vineyard in 458 fms., has a bilobed muzzle so short and retracted by the alcohol as to be hardly more than a gash in the median line between the tentacles. The figures given by Jeffreys, Forbes and Hanley, etc., which have been copied by Tryon and others, show a moderately extended bilobed muzzle, in no respect resembling Curtis's sketch. What is the explanation of these discrepancies? Simply that, in opposition to the old statements, by whomsoever made, this animal has a long retractile proboscis, which can be completely exserted so that it shows no line of division between it and the head; this is pulled in by the tip, and when nearly retracted its sides near the base resemble a muzzle vertically cleft, as there is on each side under the skin a sort of nearly cartilaginous buttress more solid than the proboscis, and which projects when the latter is withdrawn. These buttresses, however, contract strongly in alcohol, and then of the oral aperture only a vertical slit is visible between the tentacles. In the Rhachiglossa the proboscis is pulled in by the base, in this group retracted by the tip; in *Cypræa* it is usually rather short, in *Capulus* it is very long, its distal half split on the upper side, so that it can be expanded into a sort of plaque, which, I imagine, in life could envelop any small soft thing, so that the *Capulus* could smother it and suck up its juices at leisure, much as a starfish envelops a young oyster by projecting the membranes of its stomach out of its mouth and about the victim.

I regard the group as forming a family with the following characters: —

Shell patelliform, without internal processes; the nucleus spiral, posteriorly directed; the muscular impression horseshoe-shaped; the mentum prolonged for use as an oviphorus; the gill composed of laminæ, each basally attached to the under side of the dome of the mantle over the head and proceeding from left to right; the proboscis long, retractile from the tip, split above and expanded at the distal extremity; foot not secreting any shelly base; young undergoing all larval changes within the ovicapsule.

In regard to the species mentioned in Tryon's Monograph of the group, it may be added that *Hipponyx Danieli* Crosse is almost certainly *Patella calyptra* of Martyn, described in the last century. A magnificent specimen from the Fiji Islands is in the National Museum. It is a *Capulus*, and not a *Hipponyx. Hipponyx crystallinus* (Gould) Tryon is a *Thyca*, and should be transferred to *Capulus*, where Gould originally placed it. It lives parasitic on starfishes.

Section KREBSIA Mörch.

Capulus intortus Lamarck.

Capulus intortus Lamarck, Orb., Moll. Cuba, I. p. 186, pl. xxiv. figs. 22, 23, 1842.

This species was dredged by the Blake at Station 5, in the Gulf of Mexico, in 229 fms. The Fish Commission has obtained it off Hatteras, in 63–107 fms., sand, at Stations 2595 and 2601; and it was collected by Hemphill on the reefs at Key West. It is also in the Museum from the Bahamas Banks and Barbados. The deep-water specimens were all dead.

Section HYALORISIA Dall.

Capulus galea n. s.

Plate XIV. Fig. 3.

Shell thin, white, ovate, depressed, with a fine thin nearly smooth yellowish epidermis which projects beyond the margin. The apex is nearly medially placed, and extends but little behind the margin. The whole shell comprises about two whorls, of which the nucleus comprises one and a half; it is very small, dextral, and obliquely set; the exterior of the shell is smooth, almost polished, with fine concentric little-elevated lines and faint radiating striæ; margin thin, aperture ovate; interior polished, white; the muscular impression faint, extending well forward; in front of the nucleus and nearly on a level with it is a narrow arched lamina, horizontal, its greatest width about 1.0 mm. in the median line; the distance in a straight line between the ends of the arc is about 8.0 mm.; the cavity of the shell extends above this lamina and behind it into the narrower part of the spire. Max. lon. of shell, 18.5; max. lat., 15.5; alt., 5.5 mm.

Habitat. Station 275, near Barbados, in 218 fms., sand, bottom temperature 52°.5 F.

Soft parts: foot originally rounded and somewhat pointed behind, squared off and narrower in front; mentum large, thin, smooth-edged, extending beyond the foot; head large, swollen; tentacles subulate, eye pedicels present but destitute of pigment or eyes; excretory papillæ in the sinus over the head, on the right side; gill laminæ numerous, large; proboscis long, slender, split above and expanded near the tip; mantle edge smooth or not papillose; no epipodial filaments behind the foot; body conical, the upper part crammed with unextruded ova of a yellowish buff color. Not wishing to destroy the beautiful exhibition of its proboscis made by this specimen, I have refrained from dissecting it.

The lamina above described is not an independent formation, like the deck of a *Crepidula*, which to some extent it recalls at first sight, but rather a sort of fold of the shell under the apex, the like of which I have observed in

April 10, 1889.

C. hungaricus on some occasions, and sometimes in specimens of *Hipponyx.* It may be a purely individual character, but is very regular, and therefore has been fully described.

This species recalls the *C. obliquus* of the Crag, and some of the species called *Brocchia* from the Italian Tertiaries. *Brocchia* is always stated to be sinistral, and the spire viewed from behind is certainly twisted to the left of a vertical plane more than usual; but I have yet to see a single specimen in which there is a sinistral nucleus, or any genuine sinistrorsity of the rest of the shell. Possibly such may exist, but I doubt it.

FAMILY AMALTHEIDÆ.

Genus AMALTHEA SCHUMACHER.

Amalthea Schum., Essai, pp. 56, 181, pl. xxi. fig. 4, 1817.
Hipponyx Defrance, Bull. des Sciences, p. 9, 1819.

Amalthea benthophila n. s.

Plate XIV. Fig. 1 a-b.

Shell stout, white, smooth, with a smooth straw-colored epidermis and a coil of about two whorls; apex elevated, nucleus glassy, rather large, of about one whorl; surface smooth, often polished, showing only irregularities due to growth and a few microscopic spiral scratches; aperture subcircular, interior white, glossy; basal plate sometimes quite thin, as when the mollusk is seated on a flat stone or another *Amalthea*, or quite thick, as when it roosts on a *Cidaris* spine. It is marked with two diverging impressions corresponding to the position of the adductors. Lat. of aperture, 8.0; lon. of aperture, 8.0; alt., 6.0 mm.

Habitat. Off Sand Key, dead, in 50 fms.; Station 146, off St. Kitts, in 245 fms., on flat stone; Station 150, near Nevis, in 373 fms., on shells; Station 167, near Guadelupe, in 175 fms., on spines of Echini; Station 206, off Martinique, in 170 fms., on Echinus spines; Station 223, off St. Vincent, 146 fms., on shells. Bottom temperatures 45° to 55° F.

This species by its smooth surface is easily distinguished from any other. The irregularities of the Echinus spines are not reproduced on the surface of the shell, as its pedestal, secreted by the foot, covers all such inequalities. I cannot help doubting if there is any such connection between the base and the adductors as exists between the latter and the shell. The irregularities of the specimens living on a smooth surface indicate that they are not absolutely fixed to one spot, at least not more than *Gadinia* or *Crepidula* when young. If the adductors were organically attached to the base, of course it would be death to the animal to move.

The young shells, to the number of twenty or so, are protected by the mother, and attain a size of more than one whorl before leaving their capsules.

The other species of this group which belong to the fauna under consideration are *Amalthea antiquata* Linné, which occurs in South Florida and so southward; *Amalthea effodiens* Cpr., which from a typical specimen in the Museum looks distinct from any of the others, and seems to be confined to the Lesser Antilles; and *Amalthea barbata*, vars. *tuberculata* Cpr. and *costellata* Cpr., found with the last species, certainly varieties of each other, and probably both bearing a varietal relation to *A. barbata.* They are, however, much coarser and stronger than any genuine *barbata* I have seen, are brown instead of white, and less elevated in habit than *barbata*, so they may well be distinct, in which case the name of *costellata* would better be retained for the species. Lastly, there is *Amalthea subrufa* Lamarck, which I have from Key West in 50 fms., sand and coral, living on dead shells and corals. It extends from this point southward. The *Piliscus* (*Allerya*) *Krebsii* Mörch is a *Williamia*, closely related to *W. Gussoni* Costa, and belongs to the family *Siphonariidæ.* It is probably widely distributed on floating objects.

FAMILY XENOPHORIDÆ.

Genus XENOPHORA G. FISCHER.

Xenophora G. Fischer, Tableau Synopt. de Zoognosie, p. 113, Moscow, 1808. Type *X. conchyliophora* Born.

Section XENOPHORA s. s.

Xenophora conchyliophora BORN.

Trochus conchyliophorus Born, Index Mus. Cæs., p. 333.
Xenophora lævigata G. Fischer, *op. cit.*, p. 113, 1808.

Habitat. West Indies generally, and northward to the vicinity of Cape Hatteras, where it is found in 30–40 fms. The Blake obtained it at Stations 5, 10, and 12, in the southern part of the Gulf of Mexico, in 36–229 fms., ooze, bottom temperature about 50°.0 F. The Fish Commission has dredged it, living, in from 14 to 111 fms., mud, in the Gulf of Mexico and the Antilles, as well as along the Carolina coast.

This is the only identifiable species among those cited and described by Fischer. Therefore, the typical section of the genus must be composed of those species agreeing with it. *Phorus* Montfort is precisely synonymous.

This species is easily recognized by its brown base, not umbilicated, or with a mere chink in occasional young specimens, and the margin of the base not produced into a thin lamina. It does not reach as deep water as *X. caribæa*, and generally carries a much heavier load. Stones, corals (sometimes even alive), oysters, chamas, and worn remains of heavy gastropod shells, cover and conceal its surface. This species reaches back to the Eocene, under various names, but the shells show no differential characters. A fine specimen in the Museum, from the Miocene silex-beds of Tampa, Florida, was carefully cleaned of all its load by a youthful assistant, under the impression that he was relieving the fossil from extraneous matter!

Section TUGURIUM P. Fischer.

Xenophora caribæa Petit.

Xenophora caribæa Petit, Journ. de Conchyliologie, V. p. 248, pl. x. figs. 1, 2, 1856.

Habitat. Stations 12, 32, and 36, in the Gulf of Mexico, in 36–95 fms.; Station 156, off Montserrat, in 88 fms.; Station 174, off Guadelupe, dead, in 878 fms.; Station 300, near Barbados, in 82 and 100 fms.; bottom temperatures 60°–69° F. U. S. Fish Commission in the Gulf of Mexico and Antilles, in 14–274 fms., living, and northward to the vicinity of Cape Hatteras, in 30–40 fms., usually on a muddy bottom.

This species arranges small shells, usually bivalves, in a fringe around the marginal lamina. One specimen from very deep water had appropriated several small pieces of coal thrown overboard with ashes by some steamship. The open umbilicus is frequently occupied by a tubicolous annelid, which lives in good fellowship with its involuntary host. In this species the habit of cementing shells to its margin is evidently merely a habit, as the projecting shells must be inconvenient in moving about, and have no protective value. The practice is a reminiscence of a time when it was really useful, and we can assume with confidence that this species is of later development and origin than the preceding one.

The separate objects appear to be selected with a certain taste and care, as they are usually of nearly the same size, separated from one another by about the same space, and the convex side of the object is always downward.

The soft parts are small in proportion to the shell, whitish, with large eyes and long tentacles. In alcohol the opercular lobe is larger than the foot. The operculum is more lozenge-shaped than that of *X. caperata* as figured by Petit, and the nucleus is less central. The operculum is smooth outside, with an obscure central rib on the base, and striated both ways on that side.

It is worthy of note that the operculum of *X. caperata* Phil. resembles that of *X. conchyliophora* in being subsymmetrical and subtriangular, while that of the present species is asymmetrical. If this feature holds good, it would add another to the characters by which the two sections of the genus may be separated.

From the appearance of a number of specimens of this species, I have been led to suspect that, when young, the animal may have the power of extruding a purplish fluid, not unlike that of *Trophon* and some other gastropods.

On dead fragments of this species were found nearly all the specimens of *Dimya* dredged by the Blake, and they afford an excellent perch for the serpulæ, sertularians, and polyzoa which inhabit the depths.

FAMILY NATICIDÆ.

Genus NATICA LAMARCK.

Section COCHLIS MÖRCH.

Operculum shelly, with a single marginal rib.

Natica maroccana (CHEMNITZ) DILLWYN.

Nerita maroccana Chemn., Conch. Cab., V. p. 270, pl. clxxxviii. figs. 1905–1910 *ex parte*. Ulysses' Travels, p. 474. Dillwyn, Cat. Rec. Shells, II. p. 983, No. 13, 1817. (West Indies, W. Africa, Mediterranean.)

Natica Dillwynii Payr., Moll. Corse, p. 120, pl. v. figs. 27, 28, 1826.

Natica proxima C. B. Adams, Contr. Conch., p. 111, 1850. Reeve, Conch. Icon. *Natica*, fig. 126. (West Indies.)

Habitat. Mediterranean, West Africa, West Indies, and northward to Cape Hatteras, N. C.

This species, as eliminated from the mixture of species called *maroccana* and *marochiensis* by Dillwyn, should stand as the genuine *maroccana*. That the *N. proxima* Adams is identical with authentic *N. Dillwynii* Payr., I have determined by the comparison of types. The West American *maroccana* is a different species, and has a different operculum. *N. proxima* has an entirely different operculum from *N. canrena*, with which Tryon unites it (as the young), and belongs to a different section of the genus, as already pointed out by Mörch. On the other hand, *N. Dillwynii* and *avellana* Philippi, which are identical with *N. proxima*, are regarded by Tryon as distinct. He refuses the name *maroccana* or *marochiensis* to the Mediterranean form, which is really identical with that of the West Indies, and unites with the latter the West American species, which is perfectly distinct. This group, in fact, is in great need of thorough study by some one who will treat the subject with care, and work from the specimens, and not jump to conclusions from the inspection of more or less inaccurate figures. This group and that of *N. canrena* are particularly muddled, and inconsiderate wholesale lumping of species can in the present state of our knowledge do nothing but harm. I have not pretended to give even a small proportion of the synonymy. The operculum of this species has a double marginal rib, the outer half higher than the inner, and the whole, in adult specimens, separated from the central area by a rather broad flat-bottomed channel. The nucleus of the operculum is usually overlaid by a thin irregular callus, often of a dark color.

Natica livida PFEIFFER.

Natica livida Pfr., Wiegm. Arch., VI. p. 254, 1840. Mörch, Malak. Blätt., XXIV. p. 64, 1877.

Natica jamaicensis C. B. Adams, Contr. Conch., p. 111, 1850.

Natica proxima Sowerby, Thesaurus, *Natica*, pl. viii. fig. 111, not of C. B. Adams.
? *Natica rufilabris* Reeve, Conch. Icon. *Natica*, fig. 103, 1855.

Habitat. Barbados, 100 fms. Key West, Pickering. Gulf of Mexico, between Mississippi delta and Cedar Keys, in 26 fms., U. S. Fish Commission.

This form is generally more elevated than *maroccana*, and its coloring more like *Lunatia triseriata*. The nucleus is always minute, and generally dark brown. It is related to *N. maroccana*, but its operculum has only a single narrow undivided marginal rib separated by a narrow groove from the inner area, so that I can assert that the name is not a synonym. It will probably include *N. limacina* Jousseaume, but of that, again, I have seen no authentic specimen, while *rufilabris* is in the same category. *N. lacernula* Orbigny is doubtless synonymous with *livida*, and probably *N. pulchella* Pfr. also belongs here.

Section NATICA s. s.

Operculum shelly, externally multisulcate.

Natica canrena Lamarck.

This well known and characteristic species was not obtained by the Blake, but is known from authentic sources to extend from Rio Janeiro to the Antilles, and from the Antilles to Cape Hatteras. It has a large and pellucid nucleus, which will always serve to distinguish it from species of the *maroccana* group in the absence of the very characteristic operculum.

Natica castrensis n. s.

Shell four-whorled, thin, light, white painted with yellow brown. Nucleus large, lucid; an opaque white band in front of the suture with irregular brown flammules; a peripheral series of distant small obscure brown spots; base, callus, umbilicus, and aperture opaque spotless white, remainder translucent white with a network of extremely fine lines and spaces, so disposed as to form spirally directed "tent" shaped white markings on a brownish ground, recalling the pattern of *Conus gloria-maris*, the apices of the little white triangles all pointing toward the aperture; whorls extremely round, the suture consequently well marked, and almost channelled; general form about like that of *N. canrena;* umbilicus with a single moderate funicular cord, with subequal grooves above and below it, ending in a small callus with a notch behind it, and a bigger body callus behind that. Alt. 12.5, lat. 12.5 mm.

Habitat. Barbados, 100 fms. Off Sombrero, in 54 fms. Station 152, Flannegan's Passage, in 27 fms. Key West, U. S. Nat. Mus. Coll.

The painting of this species recalls that of *N. vittata* Gmelin (which is a *Lunatia*), but is much more delicate and elegant. The netted painting can only be seen by close inspection. The umbilical region differs from that of *N. can-*

rena, the callus especially being much less conspicuous; the whorls are less flattened above than in *canrena*, while the present species probably never attains anything like the size of the adult *N. canrena.* The radiating wrinkles are finer and closer, as well as less evident before the suture, than in *N. canrena*, and often almost obsolete.

Natica (? castrensis var.) perlineata Dall.

Shell in form, size, and nucleus resembling closely *N. castrensis,* but the coloration consists of very fine slightly waved transverse brown lines. The white band near the suture is obsolete, the brown lines cross it almost to the suture, there are no spots or flammules. The base is white, the lines ceasing abruptly. In the largest specimen there is a white band, extending from the suture over the periphery to the base, as if the color glands had taken a resting spell for a short time. Alt. 18.5, lat. 19.5 mm.

Habitat. Sigsbee, off Havana, in 119 fms. Barbados, in 70–140 fms. Station 5, in 229 fms.

This species is less elevated, and the lineation is much finer and closer than in *N. lineata* Lam., in which the basal white area is proportionally smaller, and the umbilical callus proportionally much larger. It differs greatly from the West American lineated species *N. elenæ* Recluz, and if not a variety of the preceding, from which its system of coloration totally differs, must be regarded as distinct. I have not seen the operculum.

Subgenus NEVERITA Risso.

Section PAYRAUDEAUTIA Bucq., Dautz., & Dollf.

Neverita nubila n. s.

Shell small, polished, grayish white, with transverse narrow streaks of very pale brown, five-whorled, with radiating grooves and wrinkles in front of the suture as in *N. livida.* Apex acute, nucleus rather large, lucid; whorls very round, flattish in front of the suture, which, near the aperture only, is a little appressed. Surface pretty well covered with very fine spiral markings, too fine and faint to be called striæ. Aperture semilunar, with a thick white callus on the body. Umbilical opening bearing about the same proportion to the size of the shell as in *N. intricata*, but the respective components dissimilar; in *N. intricata* the margin of the umbilicus is bounded by a rounded rib, separated from another similar rib above by a deep channel. Above these two is a wider and deeper furrow, above which is the larger umbilical rib, which lies very close to the preceding whorl. In *N. nubila* the umbilicus is bordered by a sharp groove, within which is a broad nearly flat band corresponding to the two lower ribs of *intricata*, above which are the larger furrow and rib, which last is not so close to the preceding whorl as in *intricata*. The umbilical region is entirely white. The operculum has not been seen, but is doubtless horny. Max. alt. of shell, 13.0; of aperture, 9.0; max. lat. of shell, 12.3 mm.

Habitat. Station 23, Gulf of Mexico, in 190 fms. Station 299, near Barbados, in 140 fms.

In one of the specimens the cloudy brown color was diffused, and most evident above the periphery. In the other it was more in the form of faint transverse streaks. The shell is especially different from *N. intricata* in its turrited spire and rounded whorls with radiating grooves above, and in the peculiarities of the umbilical region below.

Subgenus LUNATIA Gray.

Lunatia tenuis Recluz.

Natica tenuis Recluz, Journ. de Conchyl., I. p. 388, pl. xii. fig. 7, 1850.

Habitat. Off Cape San Antonio, in 640 fms. Off Cape Florida, in 84 fms., green mud, U. S. Fish Commission, at Station 2648; also at Station 2626, eighty-seven miles S. by E. ½ E. from Cape Fear, N. C., in 353 fms., sand, bottom temperature 40°.0 F. Valparaiso, Recluz.

The specimens agree admirably with Recluz's figure and description, but are smaller than the dimensions he gives. There may have been an error or misprint in those figures.

Lunatia leptalea Watson.

Natica leptalea Watson, Journ. Linn. Soc., XV. p. 261, March, 1880; Dall, Bull. M. C. Z., IX. p. 93, 1881; Watson, Chall. Rep. Gastr., p. 441, pl. xxvii. fig. 7, 1885.

Habitat. Yucatan Strait, 640 fms. Sombrero Island, W. I., 450 fms., Challenger Exp. Bed of the Gulf Stream, off Gun Cay, in 500 fms., Dr. Rush.

A comparison of specimens leads me to believe that this species is identical with one named by Dr. Jeffreys *N. sphæroides*, in his Report on the Valorous Mollusca (Ann. Mag. Nat. Hist., April, 1876, p. 319). But Dr. Jeffreys did not describe his shell sufficiently, or figure it, and subsequently doubted whether it was not the young of a species he described in 1885 as *N. operculata* (P. Z. S. 1885, p. 35). His name has therefore no claim to be adopted.

Lunatia fringilla Dall.

Plate XXI. Fig. 12.

Natica fringilla Dall, Bull. M. C. Z., IX. p. 93, Sept., 1881.
? *Natica radiata* Watson, Prel. Rep. Chall. Moll., Pt. VII. p. 258, March, 1881.

Habitat. Yucatan Strait, 640 fms.; off Cape San Antonio, 640 fms.; near Old Providence, at Station 2150, in 382 fms., ooze, bottom temperature 46°.0 F., U. S. Fish Commission.

Natica fringilla var. perla Dall.

Plate XXI. Fig. 11.

Differs from the type of the species in the absence of the radiating wrinkles in front of the suture, and in having somewhat rounder whorls and a decidedly smaller umbilicus. Alt. 6.5 mm.

Habitat. Station 226, in 424 fms., sand and ooze, near St. Vincent, bottom temperature 42°.5 F.

The *Lunatia subplicata* Jeffreys is less elevated, has merely faint irregular wrinkles instead of the strong, regularly spaced, spoke-like radiations of this species, and is a much lighter shell. It recalls *L. grönlandica* Beck, of which it might be a small deep-water race. If identical with *fringilla* it would be a synonym of it.

The *N. radiata* Watson, from 435 fms., near Bermuda, recalls, by the description, our species. The figure, however, has a more pointed apex and rounder whorls. This plate, however, is less well executed than most of the Challenger plates, and may not be reliable. In case, on comparison of specimens, they should prove to be the same, Mr. Watson's name has priority.

Subgenus POLINICES Montfort.

Polinices uberina Orbigny.

Natica uberina Orbigny, Moll. Cub., II. p. 31, pl. xvii. fig. 19, 1842. Mörch, Malak. Blätt., XXIV. p. 60, 1877.

Habitat. Off Sombrero, in 54–70 fms. Gulf of Mexico and on the west coast of Florida, 14–40 fms., living, U. S. Fish Commission.

This may be only a small race of *N. lactea* Guilding. I have not the material to determine the matter positively, and prefer to refer to a name which exactly applies to our specimens.

When fresh they are covered with a rather dark yellow epidermis, which is thickened to a reddish brown in the furrow of the umbilicus. *N. caribæa* Phil., *N. Pfeifferi* Phil., *N. porcellana* (Orb.) Mörch, and *N. ochrostoma* Recluz, are probably synonymous.

Judging by the specimens dredged by the U. S. Fish Commission, this species is rather common in moderate depths of water off the Carolina coast.

Among the *Naticidæ* characteristic of the Antillean region, but not above referred to, are *N.* (*Lunatia*) *semisulcata* Gray (recently named *N. Fordiana* by an inadvertence), which was collected at Sarasota Bay, West Florida, by Mr. C. T. Simpson, living, between tides on a sand-bar; *N.* (*Stigmaulax*) *sulcata* Born; and *N.* (*Polinices*) *brunnea* Link (+ *mamillaris* Lam.). *N.* (*Neverita*) *duplicata* Say (+ *campechiensis* Recluz, + *fossata* Gould, + *texasiana* Römer) and *N.* (*Cochlis*) *pusilla* Say are more northern in their distribution; the latter may not pass south of the Florida Keys.

Genus SIGARETUS Lamarck.

Sigaretus maculatus Say (+ *S. zonatus* Orb., 1842, + *S. martinianus* Phil., 1844) and *S. perspectivus* Say (+ *S. depressus* Phil., 1844, + *S. haliotoideus* Recl., Orb., non Linné, + *S. antillarum* Recl., 1851) are the two large well known species of this region. In the latter, which I have seen alive, and in alcohol, a good many times, I have never been able to observe any operculum. It is probable that it is generally lost at an early age.

Sigaretus minor n. s.

Shell small, moderately inflated, white, three or four whorled, spirally striate. Nucleus small, dark brown, and glassy for one whorl, very finely striate spirally and white for another whorl, when the normal adult sculpture begins abruptly. Epidermis extremely thin, nearly transparent, colorless; spiral sculpture alternately of a large and a small thread, separated by a distinct, sharp, but very narrow groove; on the base the threads are less crowded and more uniform, but not flattened; shell perforate, little callus on the body, the pillar barely reflected at its junction with the body; aperture, regarded in its own plane, nearly circular. Max. alt. of shell, 4.0; max. diam. of shell, 6.0; of aperture, 3.5 mm.

Habitat. Off Sombrero, in 54 fms.; Station 36, in 84 fms.; U. S. Fish Commission Station 2648, in 84 fms., mud, off Cape Florida.

This shell differs from the two other species in sculpture. The young of *S. maculatus* is brown, and has a much larger umbilicus and nearly smooth base, with a sculpture of uniform, round, widely separated threads on a flat ground. The young of *S. perspectivus* is flatter, has a thick epidermis, and has broad flat spirals separated by broad shallow channels.

The soft parts of *S. minor* have not been observed, but it is a genuine *Sigaretus* though of small size.

Subgenus EUNATICINA Fischer.

Eunaticina carolinensis n. s.

Shell naticiform, small, white, spirally striate, with an ample but not flaring umbilicus; four-whorled. Nucleus brown at the apex, then glassy, of two whorls. Remainder of the shell white, with a polished straw-colored epidermis; spire moderately elevated, suture channelled; spiral sculpture of fine sharp grooves, more distant toward the periphery, about nine between the periphery and suture on the last whorl; base full and rounded, rounding into the umbilicus without any keel; transverse sculpture of incremental lines, weaker and stronger irregularly, reticulating the earlier whorls in a faint manner and crenulating finely the margin of the sutural channel; these lines are fainter on the last whorl and on the periphery; aperture somewhat oblique, semilunar, entire, not reflected, the pillar connected with the outer lip by a white callus over the body, with its boundaries sharply defined. Alt. of shell, 5.5; of aperture, 4.5; max. lat. of shell, 5.75 mm.

Habitat. U. S. Fish Commission Stations 2595 and 2602, off the coast of North Carolina, in 63–124 fms., sand, bottom temperature 61° to 75° F.

This pretty little shell has a deep-water aspect, and is not sufficiently like the shallow-water species to need comparison with them. According to the latest catalogue of the subgenus, there is no other species known from this region.

Genus **GYRODES** Conrad.

Gyrodes Conrad, Journ. Acad. Nat. Sci. Phila., IV. p. 289, 1860. Stoliczka, Pal. Indica, II. p. 297, 1868. Type *Gyrodes crenata* Conrad.

Gyrodes depressa (Seguenza) Dall.

Fossarus depressus Seguenza, Bull. Real. Com. Geol. Ital., 1874, fasc. ii. p. 382.
Fossarus Crossei Weinkauff (in coll.) non Kléciak.
Adeorbis depressus Jeffreys, P. Z. S. 1885, p. 41, pl. iv. figs. 8, 8 a.

Habitat. Pliocene of Messina, Seguenza. Mediterranean, Jeffreys. North Atlantic, 100–1360 fms., Porcupine Expedition. Off Cape Lookout, at U. S. Fish Commission Stations 2612 and 2619, in 15–52 fms., sand, bottom temperature 67°.0 F.

This little shell is the same as that figured by Jeffreys under the name of *Adeorbis depressus*. It has an operculum like that of *Sigaretus* (Fischer, Man., fig. 535, p. 768). The *A. fragilis* of Sars has a multispiral operculum, and belongs to a different family, though the shells have several features in common. The *Fossarus Crossei* Kléciak, the *F. Petitiana* of Tiberi, and the *Stomatia azonea* of Brusina, from authentic specimens in the Jeffreys collection, appear to belong to a different group and certainly to a different species. These shells have every feature of Conrad's *Gyrodes*, except that they are smaller than his type. The ridge near the suture in the type is very inconstant, and often entirely absent. These shells are also somewhat variable in the compactness with which they are wound. The nucleus is glassy, minute, globular, and stands up from the apex with great prominence. The shell is remarkably elegant, and the largest American specimen has fully twice the diameter of any of the Mediterranean specimens I have seen, though otherwise indistinguishable from them. *Sigaretus problematicus* Deshayes (An. s. Vert. Bas. Paris, III. p. 90, pl. lxiv. figs. 7–9) is doubtless a young *Gyrodes*, which thus is carried back in Europe to the Eocene.

FAMILY LAMELLARIIDÆ.

In this group *Lamellaria Rangii* Bergh and *Marsenina ampla* Verrill are known from the region under consideration, but neither of them is included in the Blake collection.

Super-Family PTENOGLOSSA.

FAMILY SCALIDÆ.

Genus SCALA (HUMPHREY) AUCTORUM.

Le scalata Auct. (Favart d'Herbigny, Dict. d'Hist. Nat. Test., III. p. 296, 1775).

Turbona Browne, Hist. Jamaica, p. 403, 1756 (not binomial).

= *Scala* Klein, Meth. Test. Ostracol., p. 52, 1753 (not binomial).

= *Scala* Humphrey (apud Hvass), Mus. Calonnianum, p. 23, 1797 (anonymous and undescribed).

= *Epitonium* Sect. I. Bolten, Mus. Bolt., ed. i., pars 2a, p. 91, 1798; ed. ii., p. 64, 1819 (undescribed).

= *Cyclostoma* Lamarck, Prodrome, Mém. Soc. d'Hist. Nat. de Paris, No. 32, p. 74, 1799. Type and sole example *Turbo scalaris* L. "Le scalata," Cuvier, Anat. Comp., 1800.

= *Cyclostoma* Bosc, Hist. Nat. des Coquilles, IV. p. 84, 1802. Type *Turbo scalaris* L.

> *Cyclostoma* Schumacher, Essai, p. 196, 1817. Type *Turbo clathrus* L.

Not *Cyclostoma* Lam., Syst. des An. s. Vert., p. 87, 1801, = *Delphinula* Lam., 1804, nor *Cyclostoma* Lam., 1804 = various Pulmonates and *Valvata*.

= *Scalaria* Lamarck, Syst. des. An. s. Vert., p. 88, 1801. Type *Turbo scalaris* L. Fossiles des Env. de Paris, in An. du Muséum, IV. p. 212, 1804. Roissy, Hist. Nat. Gen. Moll., V. p. 390, 1805. Froriep, Lam. Neues Syst. Conch., p. 17, 1808. Type *T. scalaris* L.

= *Scalatarius* Duméril, Zool. Analyt., p. 164, 1806.

= *Scalaria* Link, Beschr. Rostock Samml., III. p. 131, May, 1807; Fischer, Tabl., p. 119, 1808. Blainville, Mal., p. 431, 1825. Type *Turbo scalaris* L.

= *Scalarus* Montfort, Conch. Syst., p. 295, 1810.

= *Scalaria* Perry, Conchology, expl. pl. xxvi., 1810; not *Trigona* Perry = *Cancellaria* sp.

> *Scalaria* Leach, Zoöl. Miscel., II. p. 79, 1815 (*Turbo clathrus* L.). Bowdich, Conch., I. p. 33, pl. ix. fig. 6, 1822.

> *Aciona* Leach, *l. c.*, II. p. 79, 1815 (*Turbo scalaris* L.). Bowdich, Conch., I. p. 33, pl. ix. fig. 5, 1822. Mörch, Cat. Yoldi, p. 48, 1852.

>< *Clathrus* Oken, Lehrb. Zool., p. 256, 1815 (*Turbo clathrus* L.).

= *Scalaria* Lamarck, Hist. An. sans Vert., VI. Pt. II. p. 225, 1817 (*S. pretiosa*).

> *Clathrus* Agassiz, in German edition Sowerby's Min. Conch., pp. 35, 413, 1840 (*Turbo clathrus* L.).

> *Acyonée* Blainville, Malac., p. 431, 1825; example *Scalaria communis* (vernacular for *Aciona* Leach).

Acyonæa Deshayes, Encycl. Méth., II. p. 6, 1830 (error for *Aciona* Leach).

> *Clathrus* Gray, Syn. Brit. Mus., 1840; type *Scalaria australis* Lam. (? no description).

> *Cirsotrema* Mörch, Cat. Yoldi, p. 49, 1852 (*S. varicosa* Lam.).

> *Scala* H. & A. Adams, Gen. Rec. Moll., I., Nov., 1853, p. 220 (*S. scalaris* L.), with subgenera *Clathrus*, p. 222 (*S. clathrus* L.); *Opalia*, p. 222 (*S. australis* Lam.); *Amœa*, p. 223 (*S. magnifica* Sby.); and

> *Cirsotrema* (Mörch) H. & A. Adams, *l. c.*, II. p. 223, Nov., 1853 (*S. varicosa* Lam.).

= *Scalaria* Woodward, Man. Rec. & Foss. Shells, 1854 (*S. pretiosa*).

> *Acirsa* Mörch, Prodr. Moll. Grönl., 1857; H. & A. Adams, Gen. Rec. Moll., II. p. 621, Nov., 1858 (*S. Eschrichtii* Holb.).

= *Scalaria* Chenu, Manual de Conchyl., I. p. 217, 1859 (*S. pretiosa* Lam.), with sections *Clathrus* (*S. communis* Lam.); *Opalia*, p. 218 (*S. australis* Lam.); *Amœa*, p. 218 (*S. magnifica* Sby.); and *Cirsotrema*, p. 218 (*S. varicostata* Lam.).

? *Constantia* A. Adams, Ann. Mag. Nat. Hist., 3d ser., VI. p. 120, 1860 (*C. elegans* Ad.).

> *Acrilla* H. & A. Adams, P. Z. S. 1860, p. 241 (*S. acuminata* Sby.).

<> *Scala* A. Adams, *Scalidæ* of Japan, Ann. Mag. Nat. Hist., 3d ser., VIII., 1861, p. 479; with *Amœa*, p. 482; *Clathrus*, p. 482; *Cirsotrema*, p. 482; *Constantia* (*elegans*), p. 483; and *Scaliola* (*bella*), p. 484.*

> *Sthenorytis* (Conrad) Meek, S. I. Check List Miocene Foss., p. 18, 1864. Conrad, S. I. Check List Eocene Inv. Foss., p. 15, No. 200, 1866; also in Am. Journ. Conch., III. p. 259, pl. xxi. fig. 4, Jan., 1868. (*S. pachypleura* Conrad, = *Scalaria pachypleura* Conr., Journ. Acad. Nat. Sci. Philadelphia, VIII. p. 565, 1862.)

> *Opalia* H. & A. Adams (emend.), in Carpenter, Ann. Mag. Nat. Hist., 3d ser., XIV. p. 31, Jan., 1865 (*S. australis* Lam.).

> *Scalina* Conrad, Am. Journ. Conch., I. p. 27, 1865; S. I. Check List Eocene Inv. Foss., pp. 14, 29, 1866. (*S. triquintinaria* Conr. = *Scalaria triquintinaria* Conr., Journ. Acad. Nat. Sci. Philadelphia, 2d ser., I. p. 114, pl. xi. fig. 14, 1848.)

Not *Compsopleura* Conrad, S. I. Check List Eocene Inv. Foss. p. 15, 1866. (*C. trinodosa* Conr. = *Scalaria trinodosa* Conr., Journ. Acad. Nat. Sci. Philadelphia, 2d ser., IV. p. 288, pl. xlvii. fig. 43. This shell belongs to the *Melaniidæ* probably.)

> *Cirostrema* Tate, App. Woodward, Man., 1870, p. 26, = *Cirsotrema* Mörch.

= *Scalaria* Nyst, Tabl. Synopt., p. 12 (1871), 1873.

> *Scala* Mörch, Vidensk. Medd. Nat. Foren. Kjöbenhavn, 1874, p. 252; with sections *Aciona*, p. 252 (*S. scalaris* L.); *Scala*, p. 252 (*S. clathrus* L.); *Turbona* "Browne," p. 259 (*S. unifasciata* Sby.); *Amœa*, p. 262; *Opalia*, p. 266; *Cirsotrema*, p. 268 (*S. cochlea* Sby.).

Scala Mörch, Journ. Acad. Nat. Sci. Philadelphia, 2d ser., VIII. p. 192, 1876; with sections *Aciona*, p. 192; *Turbona*, p. 198; *Amœa*, p. 200; *Ianthoscala*, p. 190 (*Scalaria inconspicua* Sby. = *Janthoscala*, p. 203); *Opalia*, p. 203; *Cirsotrema*, p. 205.

> *Psychrosoma* Tap. Canefri, Journ. de Conchyl., XXIV. p. 154, April, 1876 (= *Opalia* H. & A. Adams).

>< *Scalidæ* Stoliczka, Pal. Indica, Cret. Gastropoda, p. 229, 1868, with the following "genera": *Funis* (Seeley), p. 229; *Crossea* (Adams), p. 229; *Amcœa* (= lapsus pro *Amœa* Adams), p. 229; *Acirsa*, p. 229; *Acrilla*, p. 229; *Cirsotrema*,

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* Referred in 1862 to the *Rissoidæ* by Adams, from an examination of the soft parts.

p. 229; *Scala*, p. 230; *Eglisia* (Gray, 1840, not of Deshayes whose Eglisiæ are stated to = *Mathilda* Semper, while his *Pyrgiscus* are true Eglisiæ), p. 230; *Chilocyclus* (Bronn), p. 230; *Scoliostoma* Bronn, p. 230; *Constantia* (A. Ad.), p. 230; *Compsopleura* and *Scalina*, p. 230.

= *Scala* De Boury, Monographie des Scalidæ, Pt. I., Paris, 1886.

Insertæ sedis.

Scoliostoma Braun, Leonh. & Bronn, Jahrb., p. 291, 1838, *fide* Herrmannsen.

Constantia A. Adams, Ann. Mag. Nat. Hist., 3d ser., VI. p. 120, 1860 (*C. elegans* Adams, *l. c.*).

Eglisia Gray, Syn. Brit. Mus., 1840: H. & A. Ad., Gen. Rec. Moll., I. p. 354.

Pyrgiscus Deshayes, An. s. Vert. Bassin de Paris, II., 2me éd., p. 330, ? not of Philippi, Wiegm. Arch., I. p. 50, 1840.

Cochlearia Münster, Beitr. zur Petr., IV. p. 104, 1841 (*C. carinata* Braun, *l. c.*, pl. x. fig. 27). Syn. *Chilocyclus* Bronn, Lethea, c. i. 75, 1851.

Crossea A. Adams, Ann. Mag. Nat Hist., XV. p. 323, 1865 (*C. miranda* Ad., *l. c.*).

Funis Seeley, Ann. Mag. Nat. Hist., 3d ser., VII. p. 285, 1861 (*F. elongatus* Seeley, *l. c.*, pl. xi. fig. 7). Cretaceous.

Holopella McCoy, Ann. Mag. Nat. Hist., VII. p. 47, 1851. Brit. Pal. Foss., II. p. 303, 1855. (Type *Turritella gregaria*, Sil. Syst., pl. iii. fig. 1.)

Hoplopteron Fischer, Journ. de Conchyl., XXIV. p. 232, 1876. (*H. Terquemi* F., p. 234, pl. ix. figs. 1–8.)

The determination of the proper name to be adopted for this well known genus is beset with difficulties for the conscientious systematist. It is one of the few cases where a faithful adherence to the rules recommended by the British Association would result in several very annoying changes in the names of well known and accepted genera.

The precious "ladder shell," "wentle-trap," or "scalata" was known to early English, Dutch, and Italian naturalists chiefly as *le scalata*, a name attributed to the Italians. It is the *Turbo scalaris* of Linné, and the *Scalaria pretiosa* of authors. The common Mediterranean form (*S. clathrus*) was, from its abundance, small size, and inferior beauty, known as *le fausse scalata*, or false wentle-trap. Early authors even considered them as varieties of one kind of shell, and as late as 1817 discussed gravely whether the precious sort really came from the Indies, as the Dutch dealers and naturalists had always claimed.

Among the authors who antedated binominal nomenclature, Browne named a West Indian species *Turbona*, in his Natural History of Jamaica, and Klein called the group *Scala*, or staircase shell, from the vernacular *scalata*. Some conchological authors, disregarding the usual limitations of nomenclature, have imposed some of Klein's names on modern genera, and this among them.

Linné included the wentle-trap among his species of *Turbo*. The first binominal author to distinguish the group by name was Hvass, a noted conchologist residing in Paris, from whose manuscripts (by the aid of E. M. Da Costa, an English writer on shells) an anonymous catalogue was compiled for George Humphrey, an auctioneer of London, who was intrusted with the sale of the magnificent collection of M. de Calonne. The catalogue was printed in May, 1797. A few copies were sent by Hvass to his correspondents,* and others were distributed or sold by Humphrey. It is one of the rarest of conchological books, among those which have influenced nomenclature.† In the present case there can be no possible doubt whatever as to the group intended. It is placed between *Phasianella* and *Turritella* (*Eutropia* and *Terebra* of Humphrey), and divided into two sections with three species each. The first species (*Scala maculata*) is stated to come from Normandy, and *Turbo clathrus* L. is given as a synonym. The second (*S. notha*) is the "Bastard Wentle-trap," from the West Indies (*Scalaria lamellosa* L.?); the third is not identifiable. The second section is stated to be "umbilicated," an approach toward a diagnosis. Two of the species cannot be determined, the last (*S. grandis*) is the "Great or true Wentle-trap," from "Japan?"

The next discrimination of the group, as such, appears in a posthumous publication, also for an auctioneer's purposes, — a catalogue,‡ supposed to be by Dr. J. F. Bolten of Hamburg, of the collection of shells belonging to him which his family desired to dispose of after his death, but which at that time (1798) was not sold. This catalogue, of which only three or four copies are known to exist, was reprinted in 1819,§ when the collection was again offered for sale.

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* The copy in my possession was sent to Spengler, and given by one of his heirs to Beck, and from him, through other hands, to the late O. A. L. Mörch. By a contemporary note of Beck, it appears not to have existed in the public libraries of either London or Paris, in 1835–36. The genera are not characterized, nor is any species mentioned as type, but some Linnean names without references are introduced as synonyms of the names of the author.

† As a bibliographical curiosity the collation may be of interest: —

Museum Calonnianum. | Specification | of the | various articles | which compose the | Magnificent Museum | of | Natural History | collected by | M. De Calonne in France, | and lately his property : | consisting of an assemblage | of the most | beautiful and rare subjects | in | entomology, conchology, ornithology, | mineralogy, &c. | Among which are | [etc., 10 lines] | all of which are now exhibiting at Saville House on the north side of | Leicester Square, previous to the sale thereof. | London, May 1, 1797. | 8vo, pp. viii, 84. At end of last page, "End of the first part." The generic and specific names in Latin, French, and English; remarks in English only. There is a copy with annotations in Humphrey's own writing in the Smithsonian Library, deposited in the Library of Congress.

‡ The first part I have never seen, and it related to the anatomical and alcoholic collection; the remainder is entitled: Museum Boltenianum | sive | Catalogus cimeliorum | e tribus regnis naturæ | quæ | olim collegerat | Joa. Fried. Bolten, M. D. p. d. | per XL. annos protophysicus Hamburgensis. | Pars secunda | continens | Conchylia sive Testacea univalvia, | bivalvia & multivalvia. | *Hamburgi,* | Typis Johan. Christi. Trappii. | Sm. 8vo, n. d., pp. viii, 199. The Preface is dated September, 1798.

§ Museum Boltenianum. | Verzeichniss | der | von dem verstorbenen | Herrn Joachim Friedrich Bolten | M. D. und physicus in Hamburg | hinterlassenen | vortrefflichen Sammlung | Conchylien, Mineralien | und | Kunstsachen | die | am

This edition is also extremely rare. Its contents (excepting the prefatory remarks) are the same in both editions, and have a more scientific appearance than those of the catalogue of Humphrey, as characters corresponding to the divisions adopted, are mentioned in a number of places, though there are no diagnoses, properly speaking, or special types selected. The references for synonyms of the author's species are to page, plate, and figure, in many cases, instead of bare names, as in the Museum Calonnianum. The divisions are often rational and satisfactory, though frequently much the reverse if judged by modern standards. The author seems to have had no hesitation in changing names which he did not like, even when his substitute was in our sense an absolute synonym. In regard to the present genus his course was retrograde compared with Humphrey, for he makes *Scala* (Humphrey) merely the first section of his genus *Epitonium*, which contained *Scalaria* (Lam., 1801), *Turritella* (Lam.), and *Terebra* (Lam.). The first species is *Turbo scalaris* L.

By the strict construction of the rules of nomenclature, none of the names yet mentioned should be adopted, for they all fail to meet the requirements of a binominal appellation and a diagnosis or a figure.

The epoch-making work for malacology, after Linné, is without doubt the "Prodrome d'une nouvelle Classification des Coquilles" of Lamarck (1799), in which a large number of genera were proposed, appropriately characterized, and a single species in each case mentioned as an example or type. It would seem unquestionable that, for genera first proposed in it, the name should follow the fortune of the particular type mentioned. On page 68 the author states that he has adopted the names *cyclostoma* and *pleurotoma*, composed by citizen Richard, for two of his genera to which he had intended to give other names. This statement, which had reference merely to the formation of the *words*, and not of the genera they were intended to denominate, has been misunderstood to indicate Richard as the author of the two *genera* mentioned. On page 74 the genus CYCLOSTOMA* is proposed, and placed between *Monodonta* and *Turritella.* This genus was adopted the following year by Cuvier (Anat. Comp.), and by Bosc in his "Histoire Naturelle des Coquilles," published in 1802.† Bosc remarks: "One of the shells which forms this genus is very celebrated under the name of *scalata*, on account of its rarity and high price. Naturalists have differed much on the place in the conchological order which it should have (on account of the absence of a columella). . . . Lamarck at last has just made a particular genus of it, into which the question of the presence

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26. April d. J., Morgens um 10 Uhr | öffentlich verkauft werden sollen | durch den Makler | Johs. Noodt. | Hüxter No. 68 | Cat. XXXIII. | mit vier auf stein gezeichneten Platten seltener Conchylien | Hamburgischen Steindrucks. | Hamburg 1819. | Gedruckt bei Conrad Müller, Bohnenstrasse No. 151. | 8vo, 4 l. unp., 156 pp., 4 plates. Preface dated January, 1819.

* "32. Coquille de diverse forme, l'ouverture ronde ou presque ronde : les deux bords réunis circulairement. *Turbo scalaris* Lin. Le scalata."

† Vol. IV. p. 84, 1802. Another identical edition (from unsold sheets ?) with a new title page appeared in 1830.

or absence of a columella does not enter. The cyclostoma is a very elegant shell, of seven whorls, elongated, and separated by a distinct interval from one another, with ten or twelve longitudinal elevated costæ which unite themselves to form a reflected margin around the lip. It has no columella, the costæ take the place of one externally." Following this is a list, with descriptions and references, of four well known species of *Scalaria*, two species of *Turbonilla*, and two unidentifiable new species, of which one (probably a *Valvata*) is from the warm springs of Pisa. The type, *Turbo scalaris* L., is figured, pl. xxxii. fig. 3. Had matters stopped here, all would have been well. But in 1801 Draparnaud in his "Tableau des Moll. de la France" (p. 40) assigns a large number of land and fresh-water shells to *Cyclostoma*, at the instance, according to Cuvier, of Lamarck, who in that year published his "Système des Animaux sans Vertèbres," in which several arbitrary and unexplained changes are made. The name *Cyclostoma* is applied (p. 87) to a new genus, of which the sole example offered is the *Turbo delphinus* of Linné, and a new name, *Scalaria*, is proposed (p. 88) for the group typified by *Turbo scalaris* L. As if this were not enough, two years later, in a memoir on the fossil shells of the environs of Paris (An. du Muséum, IV. p. 108, 1804), after saying that in the "Système" there were still marine and terrestrial shells in his *Cyclostoma*, Lamarck proposes to eliminate the marine ones, and takes the *Turbo delphinus* L. as the type of a new genus, *Delphinula*. The *Cyclostoma* then remaining is a heterogeneous collection of *Vivipara*, *Valvata*, *Cyclostoma* (*elegans*), *Cyclophorus*, etc., a number of which do not agree with the original diagnosis of 1799. Draparnaud adopted this classification in his "Terrestrial and Fluviatile Mollusks of France" (p. 25), in 1805, and Roissy in his "History of Mollusca" (V. p. 300), in the same year. Duméril also adopted it, changing the orthography and making it masculine in termination, as it was his hobby to do with all generic names.

Scalaria for the *Turbo scalaris* group was adopted by Link in 1807,* Fischer in 1808, and Montfort in 1810 (under the masculine form). The last very justly observes (Vol. II. p. 287), that *Cyclostoma elegans* (which seemed to have become generally accepted as the type of the genus) is always without the reflected lip called for by the diagnosis; still he preserves the name and separates under the name of *Cyclophorus* the forms with the broadly reflected border to the aperture.

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* Beschreibung | der | Naturalien-Sammlung | der | Universität zu Rostock. | Erste Abtheilung. | Von | D. H. F. Link, | Professor der Naturgeschichte, Chemie und Botanik und verschiedener | Gelehrten-Gesellschaften Mitgliede. | Zugleich | empfiehlt derselbe als jetziger Rector der Universität | die | würdige Feyer des Weihnachtsfestes. | Rostock den 25sten December, 1806. | Gedruckt bey Adlers Erben. | 8vo. 1 pr. l., pp. 1–50. (Covers Mammals and Birds.)

Zweyte Abtheilung: Rostock den 29sten März, 1807. 1 pr. l., pp. 51–100. (Covers Amphibians, Snakes, Fishes, Crustacea, Insects, and part of the Mollusca.)

Dritte Abtheilung: Rostock den 17ten May, 1807. 1 pr. l., pp. 101–165. (Remainder of Mollusks, with Echinoderms and Corals.)

Vierte Abtheilung: Rostock den 25sten December, 1807. 1 pr. l., pp. 1–30. (Fossils of all sorts.)

Fünfte Abtheilung: Rostock den 17ten April, 1808. 1 pr. l., pp. 1–38. (Mineralogie.)

Sechste und letzte Abtheilung: Rostock den 5ten Junius, 1808. 1 pr. l., pp. 1–38. (Metals and Ores, together with Errata, etc.)

No apology is needed for giving the collation of this rare work, of which only

April 12, 1889.

Scientific news did not travel rapidly in those days, and we find the careful Schumacher, evidently puzzled by Lamarck's different values for *Cyclostoma*, trying to reconcile them by retaining *Cyclostoma* for the *Turbo clathrus* sort, and *Scalaria* for *Turbo scalaris*, etc. This distinction, more apparent than real, had previously been recognized by Leach, who in 1815 proposed the name *Aciona* for the umbilicated kinds like *T. scalaris*, and retained the name *Scalaria* for the *clathrus* group. Both sections have since received quite a number of names.

It is evident that on the face of the record, and from the action of various naturalists at the time, the name *Cyclostoma*, if retained at all, should be used for *Scalaria* Lam., as commonly understood. Pfeiffer, in rejecting it altogether from the nomenclature of *Pulmonata*, has, it seems to us, taken the proper course, so far as that group is concerned. We can fairly claim that the record should decide these matters, and that possible mental reservations and traditions must be excluded from consideration. But the old naturalists were very loose in their treatment of nomenclature, as may be inferred from the remarks of Cuvier as late as 1817 (Mém. sur la Vivipare, p. 3): "Draparnaud in accordance with the indication of Lamarck ranges it (*Vivipara*) among the Cyclostomas. . . . Nothing doubtless prevents us from taking the vivipara for the type of the genus cyclostoma, but it is probable that then we should be obliged to exclude several species which have so far remained there, and notably all the terrestrials." The fact that *Vivipara* does not agree with the original diagnosis and type of *Cyclostoma*, does not seem to have occurred to him. Deshayes, in his edition of Lamarck's "Histoire des Animaux sans Vertèbres" (1836), tries to justify the process by which *Cyclostoma* has come to represent something quite different from its original type; but I do not consider that his remarks give a fair statement of the history of the case as it appears in the printed record, though they may correctly convey traditions with which those who desire impartially to apply the rules of nomenclature cannot legitimately concern themselves.

The question then remains what name to adopt, and it is evident that *Scalaria* is out of the question. Klein can by no stretch of courtesy in which the

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two or three copies are known, most of the edition, according to Herrmannsen, having been destroyed by fire. The genera proposed in it are often well conceived and properly characterized, with references to the place of description, etc. of the species included under them. If the work is to be considered as *published*, there is no doubt that the new genera proposed in it, other things being equal, must be admitted to nomenclature.

truth abides be considered as a binomial author. His names, when adopted by some one who recognizes the Linnean nomenclature, may stand, but not as of Klein, who opposed Linnæus and all his works. Humphrey is the first to adopt the Kleinian *Scala* for the genus, and, though he gave no definition, yet in this case there is no doubt as to the species referred to. It would seem, therefore, as if the interests of science would be better served by adopting the name of Humphrey, than by stickling for the exact letter of the law. This is the course I have decided to follow.

The dentition of the Scalidæ is little known, only a few species having been examined. It varies from a series of perfectly simple, rather short, arcuate laterals, to those in which the tip of the tooth is denticulated, and the shaft is long, slender, and nearly straight, except at the base and tip. These differences do not march with the conchological characters, *S. communis* Lamarck having simple teeth (Troschel), and *S. Sayana* Dall (*S. clathrus* Say pro parte), so similar as to shell that Say united it with *communis* under the name of *clathrus*, having denticulate teeth. The foot in some species is bifid and doubly carinate behind the operculum, as in *S. Sayana*, but this is also the case in species like *S. Trevelyana* with a widely different shell. On the other hand, *S. communis* has the foot tapering to a point behind (Jeffreys), and *S. lineata* Say has it rounded (Stimpson). The operculum may be either stout and black, or pellucid horny. The animal has a gizzard provided with horny plates having a reticulated grinding surface. The *Scalidæ* are carnivorous, and have separate sexes.

The soft parts of but few species are known, and the fact that their differences as far as observed do not correspond to differences of the shell as between one species and another, renders the task of assorting the very numerous forms into an orderly and natural arrangement still more difficult. The number of subgenera or sections which have been proposed, in the light of present knowledge, seems extraordinary, in so compact a group. Several of them, as those of Conrad, seem to have been offered in the absence of any differential characters, and for that reason without a diagnosis, while on the other hand some minute forms, at first referred to this family, such as *Scaliola* A. Adams, have proved, on investigation of the soft parts, to belong to a totally different family. In regard to some of the fossil forms, such as *Funis* Seeley, *Holopella* McCoy, and *Cochlearia* Munster, all of which have been referred to this family, the decision in any case must be hypothetical and unsatisfactory. *Hoplopteron* Fischer, at first sight most extraordinary, seems on further investigation to be related rather to the *Eulimidæ*. *Opalia anomala* Stearns has, however, a similar lateral arrangement of the varices, which in form are paralleled in several species of *Scala* provided with a larger number than is the type of *Hoplopteron*. Other species of *Scala* have quite as compact a spire. Still it may prove eventually, as *Scaliola* did, to belong to quite an unexpected group when the soft parts are known, a contingency which is rendered more probable by its minute size (1.15 mm.). This is also the opinion of Dr. Fischer, who, in his latest work, has referred *Hoplopteron* to the *Eulimidæ*!

Since the above was written M. E. de Boury has undertaken the laudable project of monographing the *Scalidæ* on a scale and in a manner which leave nothing but the speedy completion of the work to be desired. I therefore resign with pleasure the discussion of the various groups into which the family may be divided, and which I had partially carried out before M. de Boury's project was made known to me. I do this the more readily, as I am convinced the task is one of no little difficulty, and well worthy of special research.

The Antillean species of *Scala* number some forty or fifty, of which, so far as known, but few ascend the eastern coast of the United States northward from the Floridian peninsula except in deep water. In working up the Blake species, notes were made in regard to several points connected with the littoral fauna, some of which seem worthy of record.

Scala lineata Say.

Scala lineata, Say, Journ. Acad. Nat. Sci. Phila., II. p. 242, 1822. Not of Binney's Gould, p. 312, fig. 580, = *S. Sayana* Dall.

It appears that Kiener has fallen into some confusion in regard to this very characteristic species; but as I have no means of referring to Kiener's work, I am unable to clear it up. A sketch by Lieut. Kurtz, among Stimpson's MSS., shows that the animal has a short foot, rounded, like the small end of an egg, behind; its anterior edge strongly convexly arcuated forward, with the anterior angles projecting in an auriculate manner. The tentacles are two thirds as long as the foot, and very slender, while the median line of the head is not indented.

This species is found in the Caloosahatchie Pliocene of Florida. A curious error is contained in Mr. Binney's edition of Dr. Gould's Report on the Invertebrata of Massachusetts, p. 312, where what appears to be Say's *S. clathrus* (= *Sayana* Dall) is figured for *S. lineata* Say, a totally different species with irregular varices, some much larger than others, and a very sharply cut basal disk bordered by a purple line referred to by Say in his description. The description in Binney refers to the genuine *S. lineata;* it was written by Dr. Gould, but the figure does not represent that species. This error has been copied with the figure into the Fish Commission Report for 1871–72, in Prof. Verrill's article on the Invertebrates of Vineyard Sound (p. 660, pl. xxi. fig. 123).

Scala (Acirsa) costulata Mighels.

Turritella costulata Mighels, Proc. Bost. Soc. Nat. Hist., I. p. 50, Nov., 1841.

This species has been generally known as *Acirsa borealis* Beck, but, as Prof. Verrill has already indicated (Proc. U. S. Nat. Mus. 1882, p. 332, Sept., 1882), the earliest name for it is that of Mighels, who not unnaturally described it as a *Turritella.*

The history of the name *borealis* for this species is somewhat curious. In 1835 Sir Charles Lyell figured this species in a paper on "The Rising of Sweden," (Phil. Trans., 1835, pl. ii. figs. 11, 12,) but applied no specific name to it, and referred to it as "? *Scalaria.*" It seems that Dr. Beck, who was in correspondence with Sir Charles at the time, in regard to the stratigraphical classification of the later tertiaries, must have applied a manuscript name to this figure, though there is no published evidence of this until long afterward. In the proceedings of the Geological Society of London (Vol. III. p. 120), Lyell mentions, among other shells identified for him by Dr. Beck, from the St. Lawrence tertiaries near Quebec, *Scalaria borealis* and *Erycina labradorica.* No author is mentioned for either, nor is there any reference to a description or figure, even to Lyell's figure above cited. Upon these circumstances is founded the claim of Beck to be considered the first describer of the species, which has also been assigned by Bronn (Index Pal., III. p. 1114, 1848) and others to Lyell. All this gave no one any claim to the name as established. In fact, Beck never described or figured the species, and the only means by which his name became connected with it is by the citation of his manuscript name by Lyell, in a paper on Captain Bayfield's fossils from the Gulf and River of St. Lawrence (Geol. Trans., 2d ser., VI. p. 136), and a suggestion of its identity with the figure referred to, as published in the Philosophical Transactions. The part of the Transactions containing the reference was published in the winter of 1841–42, the exact date being inaccessible, but the matter is of little importance. The only description of the species published (with the exception about to be noted) until many years afterward, so far as I have been able to find out, was that of Dr. Mighels, which should therefore take precedence.

In 1842, Möller, working at the Copenhagen Museum in coöperation with Beck, a number of whose MS. species he published in his Index to the Mollusca of Greenland, publishes this species as named in MS. by Hölböll *S. Eschrichtii.* But Mighels's specific name antedates that of Hölböll, and the *S. costulata* of Kiener (according to Nyst a synonym of *S. tenuis*) only dates from 1842. Consequently, the species must retain the name given by Mighels. There are some further consequences connected with the establishment of Mighels's name. On the ground that Beck's name was valid, and that *Opalia* Adams (1853) is synonymous with *Acirsa* Mörch (1857), Mörch in 1874 renamed *Opalia borealis* Gould *O. Wroblewskyi;* and, in ignorance of this, two years later Tapparone-Canefri gave it the specific name of *Gouldii* on the same grounds, and even went further and renamed *Opalia,* the ranking generic or subgeneric name, *Psychrosoma*, on account of some confusion of ideas on his own part in relation to the revision (in a paper of Carpenter's) by the Messrs. Adams of their subgenus *Opalia:* a revision which they thought necessary on account of the establishment of the subgenus *Acirsa* by Mörch subsequent to the institution of *Opalia,* which would have included both. As a result, Dr. Gould's subgeneric name will stand, and the others fall into synonymy.

Scala multistriata Say.

Scalaria multistriata Say, Journ. Acad. Nat. Sci. Phila., V. p. 208, 1826.

In regard to this species, also, some confusion has prevailed. An authentic specimen preserved by Stimpson enables us to differentiate the shell. It is especially characterized by the pointed apex, with a pale glassy few-whorled nucleus, followed by a few faintly sculptured turns, the varices becoming close, uniform, small, and flattish over strong spiral sculpture. About the fifth whorl the varices become less crowded, gradually sparser though still regular, and on the last whorl one or two may be distinctly larger than the others. With these changes the spiral sculpture, *pari passu*, has become finer and fainter, at last nearly obsolete. Kiener, according to Stimpson's notes, has confounded this species with *S. clathratula*, a specimen of which he may have received under this name.

Specimens received from the U. S. Fish Commission under the name of *S. leptalea* Bush are young specimens of this species. According to Stimpson, who collected it at Beaufort, N. C., the animal is of pure hyaline bluish white, spotted with opaque white on the front of the head and foot. The tentacles are very slender, the evertible proboscis, which pulls in from the tip, is very large and oval when protruded. The front edge of the foot is double and rectilinear from side to side, not perceptibly auriculate.

Scala Sayana Dall.

S. clathrus Say *pro parte*, non Auct. or Linné.

Say described in 1831, supposing it to be the European *clathrus* (*S. communis* Lam.), a shell from which he separated as a variety *angulata*, the well known species afterward named *S. Humphreysii* by Kiener and *S. turbinata* by Conrad. The typical *clathrus* of Say, however, has never been elucidated or named. It is a white shell with nine well marked varices continuous to the apex, which has a smooth translucent pale brown nucleus of about three whorls. It has none of the coloration of *S. communis*, from pale specimens of which it differs by its greater slenderness and delicacy, by the deeper notch where the varices of one whorl join those of the preceding whorl, by the longer curve which the combined varices describe around the spire in the same length, and by the absence of the prolongation of the anterior margin of the lip, which is so marked a feature of *S. communis*. In *S. Sayana* the interstices are polished, smooth, with occasional faint microscopic spiral striæ. It never attains the size of *S. communis;* the largest specimen I have seen has nine whorls, and measures 18 by 7 mm.

The National Museum has specimens from Virginia to Key West, and also from Corpus Christi, Texas.

In a male specimen there were six slender nearly straight teeth on each side of the edentate rhachis, the tip of the largest tooth showing two deep notches, separating two very sharp curved denticles from three much smaller denticles below the lower notch. The foot is nearly five times as long as wide, grooved below in its posterior half, bifid behind, double and nearly straight across the front edge, which is a little wider than the sole behind it. The tentacles are long and slender. The crop is armed on each side by a coriaceous plate, opaque white inside, black outside, backed by a thin subovate horny plate, having a minutely cellular or reticulated surface.

Scala scipio n. s.

Shell livid flesh-color, brilliantly polished, smooth, with nine to fifteen whiter thin low varices, curved and appressed at the suture, where they are slightly expanded; here and there one is of double size. The varices are often but not always continuous; the whorls are rounded, ten or fifteen in number, of which three, hardly distinguishable from the rest except by their paleness, are nuclear ; mouth ovate, lip thin, narrow, reflected; base rounded without a disk or cordon; suture distinct but partly filled by the expanded tips of the appressed varices. Lon. 16.0, max. lat. 4.0 mm.

A specimen of eleven whorls, without the nucleus and with the aperture broken, was collected by Strebel at Vera Cruz, in 1866. A tip with the nucleus from Station 2597, in fifteen fathoms, twenty miles S. W. by S. from Cape Hatteras, N. C., was sent in by the U. S. Fish Commission, and one from 12 fms., near Frying Pan Shoals, by Dr. Rush, U. S. N., both of which are in the U. S. National Museum. This is the most slender recent species I have seen, and is readily recognized by its livid pink color, glassy polish and thin varices, compactly rolled spire, and absence of umbilicus, fasciole, or disk on the base. It is nearest to *S. aciculina* Hinds, but still more slender and drawn out.

Scala apiculata n. s.

Shell white, with three smooth nuclear whorls, then three whorls each with 15–20 close low even varices, then two whorls with about ten strong high hardly reflected varices; interspaces on the early three whorls strongly, afterward less strongly spirally grooved, the interspaces on the last two whorls quite smooth; shell imperforate, lip broad, not dentate behind, obsolete on the body whorl, and produced and somewhat scooped out anteriorly, the inner angle of this edge making a narrow fasciole around the axis. Lon. 5.0, lat. 2.5 mm.

Habitat. Off the coast of North Carolina, Stations 2596 and 2616 of the U. S. Fish Commission, in 17–50 fms., sand.

This interesting little shell presents certain analogies with *S. multistriata* Say. It is much smaller and more turbinate, the spiral sculpture and the numerous varices exist on fewer whorls, the spiral sculpture fails entirely on the later whorls, and the varices are more erect and lamellar, and the suture less distinct than in *S. multistriata* of the same length. The fasciole is quite absent in the last mentioned form, but they both agree in having more varices and stronger striæ on the early whorls than on later ones.

Scala modesta Adams.

Scala modesta C. B. Adams, Proc. Bost. Soc. Nat. Hist., II. p. 7, 1845.

The shell described by Mörch (Journ. Acad. Nat. Sci., VIII. p. 203, 1876) under this name, and serving as the type of his subgenus *Ianthoscala*, is not the shell described by Prof. Adams, as a comparison of diagnoses shows at once. *S. modesta*, from the author's types, is solid, white, with eleven continuous varices, and is engraved all over with fine sharp spiral striæ, which even ascend the varices. Mörch's shell is smooth and has twenty-one varices, and, as I do not find any name for it, may be called *S. permodesta*. *S. modesta* is well distinguished from *S. centiquadra* Mörch by the absence of decussation in the fine sculpture, and by its much stouter build and stronger varices of triangular rather than lamellar section. It has no resemblance to *S. venosa* Sby., but *S. undecimcostata* Mörch is very likely a synonym of *modesta*.

Scala clathrus Linné.

Scala clathrus Linné, Syst. Nat., ed. xii., p. 1237. (*S. lamellosa* Lam. *pro parte*, Mörch, *Scalidæ*, *loc. cit.*, p. 199.)

I am entirely in accord with Mörch as to the propriety of separating the West Indian shell from *S. lamellosa* (= *S. commutata* Mts.) of the Mediterranean. With a fine series of both before me, I can find no approach to the transition spoken of by Mr. Tryon in his Manual. The two forms are as distinguishable as the vast majority of species, and would very likely be put in two "genera" by the so called "new school" conchologists; not that this, however, would form much of an argument.

As the only *clathrus* of Linné which can be identified is the present species, it would seem as if his name should be retained for it, otherwise it must have a new one, the available synonyms all referring to the Mediterranean form.

Scala babylonia n. s.

Shell thin, white, elongate, with fifteen rounded whorls (nucleus lost) each ornamented with about twenty-five thin sharp varices each of which has a small triangular sharp point half-way from the suture to the periphery; behind these the interspaces are smooth to the suture; in front of the varical points the surface is sculptured with raised flat-topped threads with wider intervals between them and numerous still finer spiral striæ; the spiral sculpture does not crenulate the varices; shell imperforate, without basal disk or cordon; aperture small, lip thin, narrow, hardly reflected, tortuous and a little patulous at the anterior end of the axis; suture very deep. Lon. 30.0, max. lat. 6.5 mm.

Habitat. U. S. Fish Commission Station 2678, in 731 fms., light gray ooze, bottom temperature 38°.7 F.

The specimen procured was fresh, but without the soft parts. This beautiful species somewhat resembles Verrill's figure of *S. Dalliana*, but is longer, much more cylindrical, and has strong spiral sculpture which is wanting in that species. The upper fourth of *S. babylonia*, which would about correspond in size to *S. Dalliana*, has the costæ more sparse, thin and erect, the whorls much rounder, and the suture much deeper than in that species. None of the other species described from deep water are much like it.

Scala (Acrilla) retifera n. s.

Shell small, thin, yellowish or grayish, with ten ordinary and three polished dark brown smooth nuclear whorls; apex acute, whorls well rounded, suture distinct; whorls closely reticulated by (on the last about twenty-five) little-elevated thin transverse lamellæ, and five strong, even, regular revolving or spiral ribs over which the lamellæ are fluted and frilled with great regularity. The lamellæ pass from the suture to the margin of the very large basal disk, over the edge of which they pass as slightly raised lines centring at the axis of the shell, and giving a wheel-like appearance to the disk, which is also sculptured by fine radiating and stronger revolving threads; the disk is a little concave, and like the rest of the shell tinged with brownish yellow, but the columella or axis is pure white, polished, and shows a single strong spiral fasciole; the lip is thin, hardly at all reflected, the margin is angulated by the carina of the disk and at the somewhat projecting columella so that the aperture has a squarish appearance. The whole base from the suture down is occupied by the disk. Lon. 12.5, max. lat. 4.3 mm., of the largest specimen.

Habitat. Seventeen to twenty-five miles off the coast of North Carolina, at U. S. Fish Commission Stations 2595 and 2596, in 49 to 63 fms., sand, bottom temperature 75°.0 F.

This very pretty species is related to *Acrilla decussata* of Lamarck as identified by M. de Boury. This differs from *S. retifera* in its smaller and less emphasized basal disk, its much more numerous and less regular spiral striæ, and raised threads which do not flute the transverse lamellæ. *S. decussata* appears also to reach a much larger size. There is no other recent species which is at all like *S. retifera*, so far as I have been able to discover. Sowerby's figure of *decussata* is not unlike *S. retifera*, but it does not represent the original *decussata* of Lamarck, which is a fossil species.

Scala Frielei n. s.

Shell small, thin, whitish, acute at the apex, rapidly enlarging, perforate; spirally sculptured with distinct regularly evenly disposed raised threads without interstitial striæ; these are crossed by close-set fine incremental lines, and by (in the last whorl about twenty-two) hardly raised, sharp, very thin, irregularly disposed lamellæ, which are highest near the suture but not appressed or continuous over it, and are weakest on the periphery; there are three pale smooth polished nuclear, and four ordinary well inflated whorls with a deep but not channelled suture; the base is rounded, the perforation small and oblique; there is no basal disk or cordon; the mouth is rounded oval, with a thin sharp edge; the lamellæ are not crenulated by the spiral lines. Lon. 4.75, lat. 2.5 mm.

Habitat. Off Hatteras, at Station 2595 in 63 fms., sand, U. S. Fish Commission.

This pretty species has a good deal the aspect of *S. dubia*, as figured by Sowerby (Thes., pl. xxxiii. fig. 41), but has a more acute apex and unobstructed suture. It is named in honor of Mr. Herman Friele of Bergen, distinguished for his excellent researches on the Mollusks of the Norwegian North Atlantic Expedition. The varices hardly rise above the surface, and are extremely thin and sharp.

Scala Rushii n. s.

Shell resembling in details of sculpture the preceding species, but yellowish or livid with a pale peripheral zone; shell much more elongated and slender, with three nuclear and six ordinary well rounded whorls; the twenty-five lamellæ on the last whorl a little more elevated and more regularly disposed, and with a tendency to cross the suture; the base is rounded and imperforate, the mouth rounded oval, the columellar part of the lip alone thickened, the rest sharp, hardly reflected; the sutures are deep and the spiral sculpture very regularly disposed. Lon. 6.25, max. lat. 2.5 mm.

Habitat. Off Hatteras, U. S. Fish Commission Stations 2595 and 2596, in 49 to 63 fms., sand; and at Samana Bay, St. Domingo, a white, rather more slender variety, *stylina.*

This elegant little species is not unlike a *S. decussata* in miniature, with fainter varices or lamellæ, smoother surface, and no basal disk. It is dedicated to Dr. W. H. Rush, U. S. N.

In the U. S. National Museum there are two species of *Scala* of this general character, which appear to be undescribed, but which I reserve for more material if possible, as they are quite small, and represented by one or two specimens each.

Scala sericifila n. s.

Shell slender, solid, pure white, with three translucent apical and six opaque whorls, obtusely angulated at and a little concave behind the periphery.

Nuclear turns glassy, smooth, the others engraved throughout with extremely fine, sharp, well marked spiral striæ crossed by about (on the last whorl twenty-five) rounded smooth moderately elevated strong transverse ribs, very obliquely set, appressed a little at the suture, but with no sharp angles, spines, or irregularities. These ribs are separated by interspaces no wider than the ribs themselves, nearly hiding the spiral sculpture; base handsomely rounded, without disk or cordon, imperforate; aperture subcircular, lip thickened but not varicose. Lon. 5.1, max. lat. 2.0 mm.

Habitat. Coast of Honduras, Simpson.

The appearance of this little shell is extremely elegant, owing to the compact, neat, clean-cut sculpture, and the peculiar manner in which the side of the whorl next the suture is flattened away from the periphery. I have been unable to find any figure resembling it. The upper figure of Jeffreys's *S. semidisjuncta* (P. Z. S. 1884, pl. x. fig. 7), if the whorls were closer together and the varices solid and smooth instead of lamellar and angulate, would look a little like it. It recalls a piece of "stranded" cable in which the separate twines stand out clearly.

Scala nitidella n. s.

Shell thin, delicate, with nine well rounded and four nuclear whorls, having the most brilliant polish; shell white or more generally liberally blotched with cloudy spots of light brown disposed in an irregularly spiral manner along the whorl. Varices nine, frequently continuous, low, narrow, smooth, white, recurved, the tip appressed at the suture on to the preceding whorl. Base rounded, umbilicate, with no spiral sculpture, cordon, or disk; whorls in contact at the suture, which is deep and distinct; on each whorl, or nearly every one, one of the varices is markedly larger than the others; aperture egg-oval, lip moderately reflected, a little expanded toward the axis anteriorly. Apex acute, whitish, glassy. Lon. 13.5, max. lat. 5.0 mm.

Habitat. Fifteen to thirty miles off the North Carolina coast, in about 50 fms., sandy bottom, U. S. Fish Commission.

This pretty species recalls *S. lineolata* Kiener, from which, however, it is more than sufficiently separated by the great difference in the number of ribs, the form of the lip, etc. It is remarkable for the brilliant polish of its surface, and is separated from the whole *clathrus* group by the absence of any basal cordon.

Scala muscapedia n. s.

Shell thin, elongated, eight-whorled (without the nucleus) with deep sutures, inflated whorls, and imperforate base; color white with three rows of brown spots, about one spot to a varix, those on the base roundish, those on the periphery elongate pyriform, and laid on obliquely frontwise and to the right, the posterior series between the last and the suture resembling a faint band;

surface spirally sculptured with numerous strong raised lines between which are 2–4 much finer ones, all reticulated by well marked elevated incremental lines, and crossed by (on the last whorl thirteen) solid smooth white recurved varices, mostly continuous over the spire, though descending deeply into the suture and not appressed to the preceding whorl. Close to the suture is a notch in each varix, over which is recurved a very short sharp spine (usually broken off); base sculptured like the rest, with no cordon or disk, imperforate with a very narrow axial fasciole; aperture rounded ovate; lip reflected, rounded, not very wide, slightly anteriorly expanded but not patulous. On the last whorl one or two varices are larger than the rest. Lon. 17.5, max. lat. 5.5 mm.

Habitat. U. S. Fish Commission Station 2619, twenty-five miles off Cape Fear, N. C., in 15 fms.

This beautiful species is nearest to *S. centiquadra* Mörch, from which it differs by its more numerous, smaller, and differently shaped varices, which are compact and rounded, while in *centiquadra* they are sharp and blade-like; by its color, the last mentioned being white; and lastly by the different character of the reticulation, which is much more even in both directions in *centiquadra* than in the present species, resulting in a finer and more square network in the former, which when worn remains in the shape of punctures.

Scala eburnea Potiez & Michaud, is among the species dredged south of Hatteras by the U. S. Fish Commission. It is said to be the *S. fragilis* of Gray.

Scala Dalliana Verrill & Smith.

Scalaria Dalliana Verrill & Smith, Am. Journ. Sci., XX. pp. 391, 395, Nov., 1880; Trans. Conn. Acad., V. p. 527, pl. lvii. fig. 33, 1882.
Scalaria clathratula Jeffreys, P. Z. S. 1884, p. 136, not of Adams.

Off Martha's Vineyard, in 100–200 fms.; off the coast of North Carolina at Stations 2592, 2595, and 2614, in 63–168 fms., U. S. Fish Commission.

This species was referred by Dr. Jeffreys to *S. clathratula*, from which it is perfectly distinct. In examining the *Scalidæ* of the Jeffreys collection, I came upon the specimen received by Dr. Jeffreys from Prof. Verrill, and still retaining his label, upon which the erroneous opinion was based. To my surprise it proved to be a specimen of *clathratula*, quite as different from the genuine *Dalliana* as any of the European specimens. I mention this here, because, if no accidental substitution has taken place, it adds one species to our fauna, and explains what would otherwise seem an extraordinary blunder to those who are acquainted with the two species.

Scala (Cycloscala) Dunkeriana Dall.

Scalaria soluta Dunker, Mörch, Malak. Blätt., XXII., 1874, p. 145; Cat. W. I. *Scalidæ*, No. 10, p. 195, pl. xxix. fig. 5, 1876. Not *S. soluta* A. Adams, 1862, nor *S. soluta* Tiberi, 1863.

Habitat. St. Thomas, W. I. Krebs; Garden Key, Tortugas, Simpson; No

Name Key, Florida, in grass below low water, Hemphill; Turtle Harbor, Florida, in 6 fms., Dr. Rush; Samana Bay, Santo Domingo, Couthouy.

This remarkable and beautiful little species, now first announced as a member of the fauna of the Southern United States, requires a new name, as that given to it by Dunker and Mörch was already preoccupied both by Adams and Tiberi.

These cycloid *Scalidæ*, with the later whorls disjoined and the varices scalloped, like *S. hyalina*, *Dunkeriana*, etc., will probably require a section to themselves, which might well be called *Cycloscala*.

Scala (Sthenorhytis) pernobilis Fischer & Bernardi.

Scalaria pernobilis Fischer & Bernardi, Journ. de Conchyl., V. p. 293, pl. viii. figs. 2 3, 1856.

Scala pernobilis Morch, Journ. Acad. Nat. Sci. Phila., new ser., VIII. p. 196, 1876.

Habitat. Islet of Marie Galante, near Guadelupe, with a hermit crab, taken in a fisherman's net, Beau; four miles off Morro Light, Havana, Cuba, at Station No. 2, in 805 fms., Blake Expedition; at Station 2601 of the U. S. Fish Commission, thirty-six miles S. ½ W. from Cape Hatteras, in 107 fms., gray sand with pebbles, bottom temperature 67°.4 F.

This is the finest known species of the group. The only specimen taken alive and perfect is that of the U. S. Fish Commission, which measures 28 by 38 mm. The operculum is black, five or six whorled, concave, with a slightly ragged margin, dull outside, polished, with a small central prominence on the inside. The animal exuded a vast quantity of dark purple fluid, and was white in color.

Scala (Sthenorhytis) belaurita n s.

Plate XVIII. Fig. 11b.

Shell solid, white, smooth, with a short and sharply pointed spire of ten or eleven rounded whorls and widely expanded pointed varices; the last whorl forming more than half the length of the shell; nucleus glassy, thin, smooth; whorls closely adjacent, axis imperforate; spiral sculpture consisting of a single elevated thread passing from the posterior end of the aperture around the base; whorls smooth and shining, their surface overshadowed by the expanded varices, of which there are thirteen on the last whorl, which seem to be continuously joined to those of the preceding whorls; varices thin, broad, oblique, sharp, concave behind, extending directly outward from their attachment behind near the suture to a linguiform point, from which they round to the base of the aperture, and passing that are welded together in a semilunate twisted callus on the axial side of the aperture; the basal area would be well marked were not the varices continued over it in such a way as to screen it; the aperture is entire and almost circular, its margin even with the anterior plane of the varix, which, though polished, is irregularly lightly dimpled or malleated;

interior white, polished. Lon. of shell, 8.3; of last whorl, 4.4; of last varix, 3.1; of aperture, 2.5; max. lat. of last whorl, 6.75; of varix, aperture, and callus taken together, 4.75; of aperture, 2.3 mm.

Station 290, off Barbados, in 73 fms., sand and shell, bottom temperature 71°.0 F.

This very lovely species does not resemble closely any of those described in the monographs. The form of the varices recalls those of *Hoplopteron.* In its turbiniform shape it resembles *S. pernobilis*, the young of which, judging from the apex of the beautifully preserved Fish Commission specimen, have much more solid, hardly alate varices. It most resembles *S. Dianæ* Hinds, as figured by Reeve, but in this species, which comes from the Philippines, the alæ are situated on a different part of the varix, and are of a distinctly different shape.

One would think the sharp close-set varices an excellent defence, but the specimen described has been drilled by a carnivorous gastropod.

Scala centiquadra Mörch.

S. centiquadra Mörch, Cat. *Scalidæ, loc. cit.*, p. 195, pl. xxix. fig. 4, 1876 (ref. excl.), non Malak. Blätt., XXII. p. 145, 1874.

Habitat. Station 2, in 805 fms., one dead specimen; Bahamas, Rawson; off Hatteras, in 49 fms., U. S. Fish Commission.

There is no doubt that the species which Mörch described in 1876, and figured as *S. centiquadra* is entirely distinct from the shell figured by Sowerby under the name *denticulata.* Why Mörch should have confounded them does not seem plain, nor why he should have referred to the name *denticulata* as preoccupied by Montagu, when Montagu's species is a well known West Indian *Rissoina. S. denticulata* Sowerby is a good species, and has been obtained at U. S. Fish Commission Stations 2595 and 2596, in 49–63 fms., about twenty miles off the coast of North Carolina. It is striated spirally, but not decussated like *S. centiquadra.* A variety (?) sent by Governor Rawson from the Bahamas shows great irregularity in the varices, of which there are six on the last whorl, two or three of which on each whorl are much stouter than the rest, and rounder than in the typical *denticulata.* The others are fainter than the normal, and the sutures are deeper than in the type, which has about twice as many varices. This variety I have named *S. bahamensis*, but I am not confident that a larger series would not establish it as a good species.

Scala Pourtalesii Verrill & Smith.

Scalaria Pourtalesii V. & S., Am. Journ. of Science, pp. 391, 395, Nov., 1880; Trans. Conn. Acad., V. p. 527, pl. lvii. fig. 32, 1882.

Habitat. Off Martha's Vineyard, in 85–115 fms., Verrill; fourteen miles west of Gun Cay, Bahamas, in 351 fms., Dr. Rush; off Sombrero, West Indies, in 72 fms., Blake Expedition.

This pretty species is very near *S. centiquadra*, but is more turbiniform, has a looser coil and a perceptible umbilicus, and is distinctly striated only in a spiral direction.

Scala Krebsii Mörch.

Scala Krebsii Mörch, Malak. Blätt., XXII. p. 142, 1875; Journ. Acad. Nat. Sci. Phila., new ser., VIII. p. 192, pl. xxix. figs. 1, 2, 1876.

Habitat. St. Martin and St. Thomas, in 60 fms., mud, Krebs; off Sombreros, in 54 fms., Blake Expedition.

The single specimen obtained is rather young.

Scala contorquata n. s.

Plate XVIII. Fig. 9.

Shell small, short, broad, acute, umbilicate, with rotund whorls loosely coiled, the later ones only joined by the fused varices; pure white, nucleus of four and a half translucent, flattened, smooth, shining whorls; the first extremely minute, the whole (in the type) set on obliquely to the axis of the adult, which has four and a half whorls, apparently smooth between the varices, but with extremely fine sharp spiral striæ scattered here and there sparsely; aperture very slightly longer than wide, rounded; peristome slightly cancellately rugose on its anterior face; varices on the last whorl twelve, attached to the front edges of those on the next above, thin, sharp, not wide, edge (when not chipped) simple, slightly produced behind near the sutures; base without rib or carina, with a narrow but deep umbilicus, around which the edges of the varices are not fused with one another. Lon. of shell, 4.7; of last whorl, 3.2; lat. 3.5; max. diam. of aperture, 1.6 mm.

Habitat. Station 248, off Grenada, in 161 fms., fine gray ooze, bottom temperature 53°.5.

This shell is shorter and more pointed than any of the species described in Mörch's Monograph of West Indian *Scalidæ*. Its nearest described relative is *S. Swiftii* Mörch, which is much more elongate, with the peristome anteriorly effuse, an almost closed axis, broader varices, and a shorter, stouter, and larger nucleus. A large series might indicate a relation closer than can be assumed from the few specimens in hand.

Scala uncinaticosta Orbigny.

Scalaria uncinaticosta Orb., Moll. Cuba, p. 19, II. pl. xi. figs. 25–27, 1842.

Scala uncinaticosta Mörch, Cat. W. I. *Scalidæ*, Journ. Acad. Nat. Sci. Phila., 2d ser., VIII. p. 201, 1876.

Habitat. St. Thomas, Krebs; Guadelupe, Candé; Barbados, in 100 fms., Hassler Expedition.

This little species is like a diminutive *S. turricula*, with proportionally strong varices and finer spiral liræ.

Scala polacia n. s.

Plate XVIII. Fig. 10.

Shell grayish white, thin, cylindrical with abruptly sharpened apex, twelve rounded whorls and numerous slightly elevated thin sharp varices; nucleus translucent, white, polished, three-whorled; subsequent whorls spirally sculptured with ten to twenty slightly raised extremely fine flattened threads about half as wide as their interspaces, uniformly distributed over the surface and of uniform size; transverse sculpture composed by the fine sharp thin reflected and anteriorly convex varices, numbering about twenty-eight on the last whorl and slightly marked on their concave posterior faces by the extension of the spiral sculpture; whorls and base beautifully rounded; suture distinct but not deep; lip not continuous over the body; line of the varices from one whorl to another in most cases continuous, over the whorl arched forward a little; aperture nearly circular, pillar very thin and not differentiated from the rest of the margin. Lon., 7.25; of last whorl, 2.5; max. lat., 2.5 mm.

Habitat. Lat. 24° 15′ N., Lon. 82° 13′ W., Station 5, off Cuba, in 229 fms., soft ooze, bottom temperature 49°.5 F.

But for the regularity of the varices and the fact that they are not crenulated, this lovely little species might be referred to *Cirsotrema.*

Scala formosissima Jeffreys.

Plate XVIII. Fig. 11.

? *Scalaria formosissima* Jeffreys, P. Z. S. 1884, p. 140, pl. x. fig. 10.

Shell small, thin, elongated, with a brown opaque sculptured nucleus of three and a half whorls and five and a half (or more) white normal whorls; imperforate, but with a chink behind the inner reflection of the peristome; the later whorls rounded, but with the periphery slightly flattened, giving a faint angulation to the base and posterior aspect of the whorl; the earlier turns do not show this; spiral sculpture between the sutures of some 8–12 flattened strong riblets, with channelled interspaces which grow wider toward the aperture but in general are narrower than the riblets; there are also some faint spiral lines; the apical turn of the nucleus is smooth and slightly asymmetrical, proportionally rather large and inflated, the remainder of the nucleus is strongly marked with flexuous riblets extending from suture to suture; the later whorls are marked with very fine transverse threads, hardly visible, and with thin, short, sharp, somewhat oblique, numerous crenulated or finely fluted varices, partly continuous with those of the preceding whorl and partly intercalary; the margins of the varices, though nowhere spinous, are slightly angulated in harmony with the above mentioned faint angulation of the last whorl or two ; they become obsolete on the somewhat flattened base, which is marginated by a slender elevated thread proceeding from the suture; the peristome is (in the type) not more reflected than the other varices, but may be so in older specimens; the aperture is somewhat oblique and nearly circular. Lon. of shell, 8.05; of nucleus, 0.5; of last whorl, 2.75; of aperture, 1.87; max. lat. of shell, 2.75; of aperture, 1.87 mm.

Habitat. Station 43, Lat. 24° 8′ N., Lon. 82° 51′ W., in 339 fms., off Tortugas Keys, bottom temperature 45°.0.

The nucleus in this species is markedly different from that of any of the other forms I have examined, not only in its relatively strong and peculiar sculpture, but in its solid and opaque consistency and deep color. I have referred this shell to Jeffreys's species with some doubt. The fragments which represent his shell in the Jeffreys collection are much more drawn out, and can hardly be the same thing; but the figure in the P. Z. S., though still somewhat more slender than the Blake shell, is intermediate, and I do not feel justified under the circumstances in proposing a new specific name for the latter. I retain, however, the diagnosis and figure, which were prepared before the publication of Dr. Jeffreys's paper, as perhaps serving to throw a little additional light on the subject.

Scala (Dentiscala) hellenica Forbes.

Scalaria hellenica Fbs., Rep. Ægean Moll., pp. 137, 189, 1843.
Rissoa? coronata Scacchi, Phil. Moll. Sicil., II. p. 127, pl. xxiii. fig. 7, 1844.
Scalaria crassilabrum Sowerby, Thes. Conch. *Scalaria*, p. 105, pl. xxxv. figs. 115, 116, 1847. Tryon, Man., IX. p. 82, pl. xvii. fig. 32, 1887.
Scalaria Scacchii Hörnes, Moll. Wienerbeck., I. p. 479, pl. xlvi. fig. 12, 1856. Jeffreys, P. Z. S. 1884, p. 140, No. 20.
Scala (Opalia) scæva Mörch, Cat. W. I. *Scalidæ*, Journ. Acad. Nat. Sci. Phila., VIII. Part II., 1876, p. 204, No. 38.
Scala (Opalia) subvaricosa Dunker, in Mörch, *loc. cit.*, p. 204, No. 39; var. *pumilio* Mörch, *loc. cit.*, p. 205. Not *S. subvaricosa* Cantraine, 1842.
Scalaria "*crassilabris* Sowerby," Mörch, *loc. cit.*, p. 205.
Scalaria hellenica Watson, Chall. Gastrop., p. 143, 1886. Tryon, Man., IX. p. 73, pl. xv. fig. 71, 1887.
? *Scalaria Leeana* Verrill, Trans. Conn. Acad., V. p. 526, pl. lvii. fig. 34, 1882. Tryon, Man., IX. p. 82, pl. xvii. fig. 31, 1887.
? *Scalaria bicarinata* Sby., P. Z. S. 1844, p. 30; Thes. Conch. *Scalaria*, p. 104, pl. xxxv. figs. 113, 114, 1847.

Habitat. Ægean Sea, Forbes; Mediterranean, Philippi and Jeffreys; Madeira, Watson; Canary Islands, 40–1260 fms., Jeffreys, MacAndrew; Fernando Noronha, 7–25 fms., Challenger Expedition; Central America, Sowerby; West Indies, St. Thomas, Anguilla, Bahamas, Mörch; Philippines, Cuming; ? Sandwich Islands, Pease; off Havana, in 80 and 119 fms., Sigsbee; 8 fms., in Strait of Florida, Dr. Rush; off Frying Pan Shoals, N. C., in 12 fms., Dr. Rush; Samana Bay, Couthouy; off coast of North Carolina, 40–168 fms., U. S. Fish Commission; Vienna Miocene and Pliocene of Piedmont, Hörnes and Nyst.

April 16, 1889.

This interesting species should be studied with a large series, for individual specimens of the varieties above referred to it would seem sufficiently distinct for specific rank, in the absence of the connecting links. The shell, as originally described by Forbes, Philippi, &c., is small, slender, and very obliquely twisted. It is characterized by a spiral sculpture of flattened delicately vesicular threads, by two revolving ridges, and by ix–xv transverse ribs. In the typical *hellenica* the ridges are obsolete, the ribs rather strong, weakest on the periphery, with pits between their extremities at the suture. There are usually a few ribs, irregularly distributed, which are larger and more varicose than the others.

In the variety *pumilio* (*subvaricosa* Dkr., non Cantraine), the anterior revolving ridge is basal, the posterior forms a peripheral carina; the ribs have disappeared, leaving only nodules on the two ridges and at the suture; there is at most one extra varix, and usually none.

The variety *scæva* Mörch differs from the typical *hellenica* in its larger size, the more oblique ribs, strongest on the periphery, the absence of the revolving ridges, especially the anterior one, and the greater prominence of the extra varices. It is proportionately stouter, and the sutural pits are smaller and more numerous, even nearly obsolete at times.

In the variety *nodosocarinata* the ridges are strong, as in var. *pumilio*, but both are more posterior, and the ribs in the intervening space are strong, regular, and oblique. In size this variety is between *pumilio* and *scæva*. There are usually no extra varices.

In what I suppose to be variety *Leeana* of Verrill, but of which I have not seen adult and perfect examples, the ridges are obsolete, the ribs more nearly axial in direction and rather irregular in breadth, stronger on the periphery in the last whorl only; the sutural line irregular and not foveolate, the extra varices numerous, sometimes one to each whorl, the spiral threads rather finer than in var. *scæva*. The shell is somewhat larger, and, as might be expected from its northern habitat, less porcellanous and more earthy in color than southern varieties. All the varieties have a smooth shining subcylindric nucleus, which is generally brownish, or if light colored has a brownish line near the suture.

In the variety *Mörchiana* the shell is more slender; the ribs are fewer, stronger at the periphery, obsolete at the sutures, which are regular, and form an even spiral without pits, the whorl in front of them being evenly marginated; there are no revolving ridges nor basal carina; the spiral sculpture is as in var. *pumilio*.

In the variety *bicarinata* the carinæ are present and very strong, but not nodose on the last whorl; from the figure the ribs would seem to be wholly absent, but the suture is conspicuously punctate. Reeve's figure in the Iconica looks as if the type was a worn or beach specimen.

Scala hellenica var. Mörchiana Dall.

Plate XVIII. Fig. 1.

Shell small, slender, acute, solid, finely reticulate, imperforate, with seven and a half normal and three and a half thin, translucent, smooth, shining, nuclear whorls; spiral sculpture of twelve to fifteen flattened crowded threads, a broader one marginating the anterior edge of the suture to which it is closely appressed; these cross (on the last whorl 9–10) rather angular transverse ribs, which on the last whorl are a little elbowed on the periphery, but in general are pretty even, becoming obsolete toward the sutures. The spiral threads are crossed by a multitude of extremely fine, rather even sharply defined liræ, which extend from suture to suture, neatly reticulating the spiral sculpture, and giving to the extremely narrow interspaces a punctate aspect; there are very few varices on the shell; in the type the last whorl begins and ends with one; the aperture is nearly circular, with a groove around its inner margin, outside of which is the cancellated anterior face of the very thick varix, which is somewhat excavated behind; base rounded without carina or special sculpture. Lon. of shell, 6.87; of last whorl, 2.5; of aperture, 1.25; max. lat. of last whorl, 2.0 mm.

Habitat. Barbados, 100 fms.

Scala (Dentiscala) aurifila n. s.

Plate XVIII. Fig. 4.

Shell slender, solid, white, evenly tapered, with about thirteen moderately rounded, rather strongly sculptured whorls. Nucleus ? (missing in the type); longitudinal sculpture consisting, first, of five or six uniform strong rounded threads having a light yellowish color, which, when the shell is fresh, contrasts distinctly with the opaque whiteness of the rest of the surface; these threads pass over the transverse sculpture without nodulation, and are at a nearly uniform distance from each other, but the space between the posterior thread and the suture behind it is nearly twice as wide as the others; the remaining spiral sculpture is composed of very much finer, even, uniform rounded threads, four to six between each two large ones, and (on the last whorl) ten or eleven between the posterior strong thread and the suture; these are on the later whorls reticulated by similar but transverse threads, which pass over the whole sculpture from suture to suture, but which are obsolete or absent on the smaller whorls; in addition to these there are on each whorl about twelve strong rounded costæ or elevated waves, extending backward from the periphery of the base to the suture, which is coronated by their stout rounded terminations with the appearance of pits between them; these ribs have a slightly flexuous outline, and upon nearly every whorl there is one or more of them stouter, more elevated, and more oblique than the others, having the character of a varix; the base is rounded, the basal area is small, margined by a strong rounded elevated thread under which the anterior ends of the transverse costæ appear to be inserted, forming pits between them and rendering the outline of the basal surface somewhat stellate; within the margin there are one or two strong and numerous fine spiral threads, but the transverse sculpture seems obsolete; the aperture is rounded to the right, slightly flattened on the basal side, and narrowed behind; inside white and polished and with a slightly projecting margin behind which is the broad face of the thickened varix, over which the sculpture of the whorl is continued to meet the aforesaid margin; the aperture is entire, but the axis is imperforate and the whorls closely adjacent; the operculum is pale translucent yellow, of about three turns. Lon. of shell, 11.0; of last whorl, 3.6; of aperture, 1.5; max. lat. of last whorl, 2.75; of the basal area, 1.5 mm.

Habitat. Station 206, off Martinique, in 270 fms., fine sand and mud, bottom temperature 49°.0 F.

This beautiful little species has quite a different aspect from the *S. crenulata* group, to which it is most nearly allied. The yellowish color, which was quite marked when fresh, has in a year faded considerably, though the shell has not been exposed to the light. The operculum differs from that of the northern and extreme southern Opaliæ in being thin, yellow, and translucent, instead of opaque and black.

Scala (Opalia) concava n. s.

Shell dead and brown, with the nucleus and basal whorl imperfect; the color is probably grayish or brownish white when in good condition; whorls 12–14, excluding the nuclear whorls; transverse sculpture of about eleven strong, narrow, elevated, round-topped ribs extending across the whorls, which last, in the young stages, are somewhat rounded, but near maturity are quite flattened; the ribs are not continuous nor exactly alternate from whorl to whorl, but fall in with some irregularity; beside the ribs there are many close, fine, even, slightly elevated threads covering the whole surface and corresponding apparently to the incremental lines; longitudinal sculpture consisting of similar but less uniform revolving threads which cover the whole surface, but which a short distance before the suture are for a little space more distant, coarser, and more prominent than elsewhere; the intersection of these with the transverse threads gives the surface a decayed or porous appearance under strong magnification; beside this there is a single strong not much elevated carinal rib which revolves at the periphery of the base, and between the whorls forms a cord-like ridge separating the transverse ribs on one whorl from the same on the next whorl; the anterior margin of the suture is appressed toward this carina very closely; the base of the shell is smooth, and in the type quite concave from the carina to the pillar, but in the last adult whorl when perfect it is probably nearly flat; aperture rather small, angulated by the end of the carina, squarish. Lon. of shell, 14.0; max. lat., 4.0 mm.

Habitat. Sand Key, 15 fms., with *Pagurus*.

This shell had been occupied by a minute hermit crab, and had the aspect of belonging in deeper water than that from which it was dredged. Notwithstanding its imperfect state, its characters are sufficiently distinct from any described species belonging to the region to identify it under any circumstances. Its superficial aspect is not unlike a small slender brown *Opalia Wroblewskyi* (= *O. borealis* Gould, non Beck), though the ribs are more regular and more elevated, but placed under a strong lens the minute sculpture comes out with distinctness, and the resemblance to *O. Wroblewskyi* is lost. It is related to *O. longissima* Seguenza, of the Italian Tertiary, but is more cylindrical and slender, with fewer more pronounced and straighter transverse ribs.

Scala (Opalia) discobolaria n. s.

Plate XVIII. Fig. 2.

Shell with six or more stout rounded whorls, rather rapidly enlarging; sculpture, in a transverse sense, consisting of (on the sixth whorl sixteen) stout rounded ribs, with interspaces not channelled, and extending from suture to suture; surface granulose or porous, with, in the (somewhat worn) type, no indication of distinct spiral or reticulate sculpture; base solid, thickened, flattish or slightly convex, with a distinct margin, disk-like, granulose like the rest; the margin is buried in the suture so that it is invisible except on the last whorl; aperture rounded, small; color whitish externally, brownish beneath the white layer. Lon., 6.5; max. lat., 3.0; lon. of last whorl, 3.0 mm.

Habitat. Station 20, off Bahia Honda, in 220 fms., bottom temperature 62°.0 F. Lat. 23° 2′.5, Lon. 83° 10′.5 W.

The type is considerably worn and has lost its nuclear whorls, but is perfectly distinct from any of the species hitherto described from the region. Its strong numerous rounded costæ, disk-like base, rounded whorls, granular surface, and unmarginated suture will suffice to distinguish it whenever perfect specimens may be obtained.

Genus ACLIS Lovèn.

The position of this group does not seem very well established. I have serious doubts as to whether it should be placed in the *Scalidæ*, or referred to the *Pyramidellidæ*, as Jeffreys would have it. The nucleus looks as if it might be in reality sinistral, but turned over so completely and at such an early date as to appear dextral. Observations on the extreme young are necessary to settle the question. All that is at present known leaves the matter doubtful.

Aclis (supranitida Wood var.?) lata Dall.

Plate XVIII. Fig. 8.

Shell like *A. supranitida* but proportionally wider and with a wider umbilicus, with the suture less distinct and the whorls less incurved; color greenish white; whorls, 13. Max. lon. of shell, 5.5; max. lat., 2.25 mm.

Habitat. Barbados, in 100 fms.

This shell has a different aspect from the European species, but when the differences are formulated, as above, they do not sound very important. I presume it to be distinct.

Aclis egregia n. s.

Plate XVIII. Fig. 12.

Shell thin, not polished, whitish, rather acute, eleven-whorled; whorls neatly rounded, with distinct but not open or channelled sutures; nucleus smooth, translucent, a little pinched or turned up; the first three or four whorls nearly smooth, the next two or three with about twenty somewhat irregular costæ which are more prominent posteriorly; the subsequent whorls are nearly smooth, except for rather coarse lines of growth, with occasional faint indications of costæ; spiral sculpture none or very little; aperture pointed behind, somewhat produced in front, completed by a thin callus on the body; margins hardly thickened, that of the columella slightly reflected, forming a deep chink but no umbilicus; without teeth, plaits, or folds of any kind. Operculum and soft parts unknown. Lon. of shell, 13.0; of aperture, 4.0; max. lat. of shell, 4.7 mm.

Habitat. Station 228, off St. Vincent, in 785 fms., fine gray sand and ooze, bottom temperature 39°.5 F. Station 163, off Guadeloupe, in 769 fms., fine sand, bottom temperature 39°.75.

This species is very large for a true *Aclis*, and may possibly belong to another group, but agrees in all particulars with the European *A. supranitida* and others of the group, with which I have compared it. In the absence of the soft parts, some doubt must remain on the subject.

Aclis nucleata n. s.

Plate XVIII. Fig. 7.

Shell white, polished, shining, elongated, with a blunt apex and minutely perforate base; whorls eleven and a half, less inflated and more uniform in size than in *A. egregia;* nucleus immersed, oblique, much larger than in the last species; sculpture indistinct, consisting of irregular indefinite transverse very slightly elevated ridges crossed here and there by obscure spiral lines, the whole only visible under a lens and giving the surface a slightly malleated aspect; suture slightly appressed, distinct, not deep; aperture much as in the last species but not quite so much produced anteriorly; pillar thin, lightly reflected part way over a very minute axial perforation; outer lip thin, sharp, very little callus on the body between the posterior corners of the aperture. Lon. of shell, 9.3; of aperture, 2.25; max. lat. of shell, 3.0 mm.

Habitat. Station 230, off St. Vincent, in 464 fms., gray ooze, bottom temperature 41°.5 F.

This little shell has a general resemblance to *A. egregia* except in the particulars noted, is about one third less in length and two fifths less in maximum diameter. The nucleus is nevertheless about four times larger than that part in *A. egregia*. In both it is partially turned up, and more or less immersed in the first normal whorl, like the European species, with which I have compared it.

Super-Family GYMNOGLOSSA.

Family EULIMIDÆ.

Genus **EULIMA** Risso.

Eulima Risso, Hist. Eur. Mérid. Moll., IV. p. 123, 1826. First species, *E. polita* Linné.

The first discrimination of any part of this genus was the separation by Bowdich, in 1822 (Elem. of Conchology, p. 27), of the genus *Melania*, as then understood, into six groups, one of which, *Melanella*, was described as "semi-transparent, mouth invaded by the last whorl, white, turrited, spire curved, marine." The type, *M. Dufresnei* (pl. vi. fig. 17), is fairly well figured, and is probably the shell generally known as *Eulima major* Sowerby, noted for its distorted spire. The genus is assigned to M. Dufresne, but this is evidently a mere compliment, as Bowdich in his foot-note says, "I have ventured to separate the *marine* Melaniæ, under the name of *Melantho*, the *Melanella* (in the cabinet of M. Dufresne)," etc.

In addition to the disagreeableness of doing away with a name so universally adopted and appropriate as *Eulima* after sixty-two years of almost undisputed use, it is particularly annoying to be called upon to apply to a genus remarkable for the snowy whiteness of its species a name which implies that they are black. There is, however, a way out of the difficulty, though not strictly regular, which the circumstances seem to justify. The principal character of *Melanella* Bowdich is that the spire is curved. Risso's species, on the other hand, are those with straight spires; the only one he figures is a *Liostraca*, and his first species is *E. polita*. We may then retain the objectionable name of *Melanella* for the humpbacked Eulimas, and Risso's name for the more normal and elegant species. In this way the laws of nomenclature will not be infringed, and our feelings will be less outraged.*

Melanella was indicated by Blainville in 1825 as Subdivision C of his genus *Phasianella*, and he figures the same species as the type (Manual, pl. xxxv. fig. 5) under the name of *Phasianella inflexa*.

There are many species in the West Indies, but only a few were collected by the Blake. Beside those herein enumerated, the following species are known from the southern and eastern coasts of the United States: *Eulima conoidea* Kurtz & Stimpson (Carolina coast to the Florida Keys and fossil in the Pliocene of South Carolina); *Eulima gracilis* C. B. Adams (Antilles and Yucatan to Cape Fear, N. C.); *Eulima subcarinata* Orbigny (1842, + *E. oleacea*, Tryon, Man., VIII. pl. lxix. fig. 36, non Kurtz & Stimpson, Antilles to Florida and Hatteras); *Eulima Carolii* Dall (*E. affinis* C. B. Adams, 1850, non Philippi, 1844, Jamaica, Florida to North Carolina, in 8–63 fms., sand); and *Eulima* (*Melanella*) *gibba* De Folin (63 fms., sand, off Cape Hatteras), originally from West America.

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* Since the above was written, the subject has been discussed by Dr. Paul Fischer in the Journal de Conchyliologie, Vol. XXVII. p. 192.

The "*Odostomia*" *alba* of Calkins (Davenport, Iowa, Acad. Sci., p. 239, pl. viii. fig. 3, 1878; non Jeffreys, 1857); described from Florida, on a comparison of the original type kindly lent me by Mr. T. H. Aldrich of Cincinnati, proves to be *Eulima conoidea* Kurtz & Stimpson. Both the original figure and Tryon's copy of it look very little like the specimen itself.

Section EULIMA s. s.

Eulima intermedia CANTRAINE.

Eulima oleacea Kurtz & Stimpson, Proc. Bost. Soc. Nat. Hist., IV. p. 115, 1851.
Eulima intermedia Cantraine, Bull. Acad. Bruxelles, p. 14, 1835. Jeffreys, P. Z. S. 1884, p. 366; Brit. Conch., IV. p. 503, V. p. 214, pl. lxxvii. fig. 4.

Habitat. Barbados, in 100 fms. Northward to New England. Mediterranean, British Seas, etc.

It is probable that the name of *intermedia* ought not to stand, as the original description would have applied to any *Eulima* and many other shells. It would have been impossible to identify Cantraine's shell except with his specimens. On the other hand, the name has come into use, and the shell has been identified, while the American name and species are little known. I have compared authentic specimens of both species, and have no doubt of their identity.

Eulima jamaicensis C. B. ADAMS.

Eulima jamaicensis C. B. Adams, Proc. Bost. Soc. Nat. Hist., II. p. 6, 1845.

Habitat. Gulf of Mexico, Station 20, in 220 fms.; also Barbados, in 100 fms. Florida, Hemphill and Jewett.

For some time Mr. Tryon identified this species with *Eulima pusilla* Sowerby. In his Manual he does not unite them, but unites two equally dissimilar species under that name (cf. figs. 6, 7, pl. lxviii., Man., Vol. VIII.). He also identified for the Museum *Eulima gracilis* C. B. Adams as *E. pusilla* Sby., but *gracilis* is very easily distinguishable from *jamaicensis*. These errors are not repeated in the Manual, but are worth mentioning, for the sake of numerous collectors, for whom the above identifications were made, and who may not be aware that Mr. Tryon finally came to a different opinion. The specimens in the National Museum were received from Prof. Adams, and have lately been compared with his original type.

Section MELANELLA Bowdich.

Eulima arcuata C. B. Adams.

Plate XIX. Fig. 11.

Eulima arcuata C. B. Adams, Contr. Conch., p. 110, 1850.
Eulima curva (Jeffr. MS.) Monterosato, Journ. de Conchyl., XXII. p. 269, 1874. Not described. Tryon, Man., VIII. pl. lxix. fig. 49.

Habitat. Barbados, 100 fms. Jamaica, C. B. Adams. Mediterranean, Aradas, Monterosato.

The types of Jeffreys and C. B. Adams have been compared, and are identical. *E. arcuata* Sowerby (in Reeve, 1866) is a synonym of *E. major* Sowerby (1834), which in turn is a synonym of *Melanella Dufresnei* Bowdich (1822) and *Phasianella inflexa* Blainville (1825). It is a totally distinct and very much larger species.

Eulima elongata (Dautzenberg) Dall.

Eulima curva var. *elongata* Bucquoy, Dollfuss, and Dautzenberg, Moll. Mar. de Roussillon, I. p. 21, pl. xxi. fig. 15.
Eulima distorta Verrill, Trans. Conn. Acad., V. p. 526, not of Philippi.

Habitat. Barbados, 100 fms. Key Largo, Florida, in fine mossy algæ at low water, rare, Hemphill. Off the Carolina coast, 22–63 fms., sand, bottom temperature 73°.5 to 75°.0 F., U. S. Fish Commission. Norway (Sars) to the Mediterranean and Canary Islands.

This form seems to retain its characters so faithfully, that I can see no reason why it should not be considered as good a species as most others in the genus.

Subgenus LEIOSTRACA H. & A. Adams.

I can see no reason why *Leiostraca* and *Leiostracus* should not exist simultaneously in nomenclature, any more than *Cyprina* and *Cyprinus*. To reject these established names in favor of *Subularia* and *Venilia*, as has been proposed, is contrary to the spirit of scientific nomenclature, and serves to retard rather than advance science. If it be thought impracticable to adopt for *Melanella* the arrangement above suggested, the name of *Eulima* must be conserved for this group, and *Leiostraca* be abandoned.

Eulima (Leiostraca) acuta Sowerby.

Eulima acuta Sowerby, P. Z. S. 1834, p. 8. Tryon, Man., VIII. p. 280, pl. lxx. fig. 82, 1886.
Eulima bifasciata Orbigny, Moll. Cuba, I. p. 216, pl. xvi. figs. 1–3, 1842.
? *Eulima stenostoma* Verrill (Jeffreys), Trans. Conn. Acad., V. p. 536, 1882.

Habitat. Barbados, 100 fms. Samana Bay, St. Domingo, Dall. Off Frying Pan Shoals, in 12 fms., Dr. Rush. Off Cape Lookout, North Carolina, in 22 fms., sand, bottom temperature 78°.2, U. S. Fish Commission. ? Gulf of St. Lawrence (fide Jeffreys). West coast of Central America, Sowerby.

This species when in fine condition sometimes shows a pale yellow spiral line or two, on the last whorl, but it is usually white or translucent.

The other species of the subgenus known from our southern coast are *E.* (*L.*) *Hemphillii* Dall, from the Florida Keys, and *E.* (*L.*) *bilineata* Alder (1848, + *fulvocincta* C. B. Adams, 1850), which extends from Jamaica and St. Domingo to Florida, North Carolina, the Mediterranean, British Isles, and Norway. There is also a species with brown varices and a brown peripheral line, which I have only fragments insufficient fully to characterize.

Eulima (Leiostraca) fusus n. s.

Plate XIX. Fig. 11 b.

Shell very acute at both extremities, smooth, polished, white, without sculpture except the trifling inequalities due to growth; whorls (tip of two or three whorls gone) about ten, slightly angulated at the periphery, flattened behind, anteriorly subconical; suture distinct but shallow; aperture narrow, before and behind rather acute, almost canaliculate in front; the pillar straight, slightly callous; outer lip thin, simple. Lon. of shell, 13.3; of last whorl, 6.0; of aperture, 3.8; max. lat. of shell, 3.0 mm.

Habitat. Station 100, off Morro Light, Havana, Cuba, in 400 fms., bottom temperature 39°.75. Yucatan Strait, 640 fms.

A remarkably spindle-shaped shell, with the aperture almost channelled in front.

Genus NISO Risso.

Niso splendidula Sowerby.

Niso splendidula A. Adams, Thes. Conch. *Niso*, p. 801, No. 4, pl. clxx. fig. 8, 1854.
Eulima splendidula Sowerby, P. Z. S. 1834.

Habitat. U. S. Fish Commission Station 2619, off the coast of North Carolina, 25 miles S. E. from Cape Fear, in 15 fms., sand. Station 2402, in 111 fms., mud, between the delta of the Mississippi and Cedar Keys, Florida, in the Gulf of Mexico. St. Elena, west coast of Central America in 6–8 fms., sandy mud, Cuming. Pliocene of Florida.

This magnificent shell can be identified at once by the chestnut articulations of the white bands behind the suture in the young, and on both sides of it in the adult. It has an extremely fine brown line at the keel, and at the completed margin of each varix. The body color is a handsome yellow brown.

Niso interrupta Sowerby.

Plate XVIII. Figs. 5, 6.

Niso interrupta A. Adams, *loc. cit.*, pl. clxx. fig. 9.
Eulima interrupta Sby., P. Z. S. 1834, fig. 9.
Niso œgleës Bush, Trans. Conn. Acad. Sci., VI. p. 465, pl. xlv. figs. 10, 10 a, 1885; Annual Rep. U. S. Fish Commission for 1883, p. 83, 1885.

Habitat. Gulf of Mexico at Station 36, in 84 fms. Barbados, 100 fms. Station 220, near Santa Lucia, in 116 fms., rocky bottom, temperature 58°.5 F. East coast of the United States, south of Hatteras, U. S. Fish Commission. West coast of Central America, Cuming. Japan, Dunker.

All the species of *Niso*, so far obtained from the east coast of the United States and Central America, are probably derivable from one species. They differ only by trifling distinctions of form and by their colors. The northern specimens, whatever their color, have the whorls slightly flatter than those from the Antilles or the Gulf.

The variations are as follows: —

White, with traces of color at the varical angles. (Sta. Lucia.) *N. interrupta* var. *albida*, Dall, Pl. XVIII. figs. 5, 6.

White, with brown keel. (Barbados.) Var. *circinata* Dall.

Pale brown, with narrow dark brown keel, no white bands. (Gulf of Mexico and West America.) *N. interrupta* s. s.

Pale brown, with broad brown band between two white bands at periphery. (Hatteras, N. C., 15–107 fms.) *N. interrupta* var. *tricolor* Dall.

Brown, more or less suffused with purple, brown band narrow, no white bands, flushes of purple brown on base and behind varices. (Carolina coast, 7–100 fms.) *N. interrupta* var. *œgleës* Bush.

Umbilical keel with white band on each side, other colors like var. *tricolor*, but all the white bands articulated with chestnut spots. *N.* (var. ?) *splendidula* Sby.

All of these forms exhibit transverse evenly distributed sharp straight scratches, extending forward from the suture. In general, they are difficult to see on account of the polish of the surface. The proportions are the same in all, but the young are more sharply keeled at the periphery. The keel is obsolete in the adult shell. The length and number of whorls of the largest specimen of each variety I have been able to examine are as follows : —

1. *N. splendidula.* Lon. 27.0, lat. 10.0 mm., whorls 17.
2. *N. interrupta* var. *tricolor.* Lon. 18.5, lat. 8.0 mm., whorls 14.
3. *N. interrupta* var. *œgleës.* Lon. 12.0, lat. 4.8 mm., whorls 12.
4. *N. interrupta* var. *albida.* Lon. 8.1, lat. 3.5 mm., whorls 11.
5. *N. interrupta* var. *circinata.* Lon. 6.6, lat. 3.0 mm., whorls 9.
6. *N. interrupta* s. s. Lon. 14.3, lat. 5.6 mm., whorls 14.

In the above list the nuclear whorls are not counted in any, since they are lost from some of the examples. Only numbers 1, 2, and 6 were sufficiently adult to have lost the peripheral keel on the last whorl. I have never seen an adult of the var. *æglees*, though my specimens are much larger than Miss Bush's types. The greater size of *N. splendidula* probably entitles it to specific distinction, at least until the adult extreme of *N. interrupta* is known. The transverse engraving is present on all, though varying with individuals as to strength; the section *Volusia* of Adams does not therefore seem required for *N. imbricata*, which differs only by the extent to which these are emphasized.

A fine *Niso*, which seems to differ from *N. splendidula* only in being slightly wider, and in having more numerous whorls near the apex in the length, is found in the Caloosahatchie Pliocene of Florida. Without the nuclear whorls, and perhaps one or two post-nuclear ones, the fossil has 14 whorls, with a length of 31 and a breadth of 13 mm. The markings, so far as visible, indicate a pattern like that of *splendidula;* the last whorl has no keel on the periphery, and the umbilical funnel seems a little wider proportionally than in *N. splendidula*. This shell, which is doubtless the ancestor of the last mentioned species, is not rare in the Caloosahatchie beds, and may be called *N. Willcoxiana* after Mr. Joseph Willcox of Philadelphia, who assisted me in the most cordial manner to investigate that fossil fauna.

Family PYRAMIDELLIDÆ.

Genus **PYRAMIDELLA** Lamarck.

Section LONGCHÆUS Mörch.

Shell elongated, with a peripheral sulcus and the umbilicus closed or nearly closed, a distinct notch in the aperture anteriorly, which is followed by a well marked fasciole bounding the umbilical chink.

The species of this group have, in my opinion, been inconsiderately lumped together by Mr. Tryon in his Manual of 1886.

Pyramidella crenulata Holmes.

Obeliscus arenosa Tuomey & Holmes, Pliocene Foss. S. C., p. 126, p. p. 1857, not of Conrad.

Obeliscus crenulatus Holmes, Post Pl. Foss., p. 88, pl. xiii. figs. 14, 14 a, 1859.

Pyramidella alveata Conrad, Silliman's Am. Journ. Sci., 2d ser., II. p. 398, 1846. (Tampa Bay, not described.)

Obeliscus floridanus Mörch, Malak. Blätt., 1875, p. 158.

Syrnola pulchella var. ? Mörch, Malak. Blätt., 1875, p. 159, probably.

Pyramidella tessellata Adams (*fide* Poey), Arango, Malac. Cubana, p. 161, 1880; not of Adams.

Obeliscus tesselatus Dall, Hemphill's Shells, Proc. U. S. Nat. Mus., 1883, p. 330; not of Adams.

Pyramidella conica Tryon, Man., VIII. p. 302, 1886; not of C. B. Adams.

Pyramidella hastata Tryon, *op. cit.*, p. 302; not of A. Adams.

Pyramidella variegata Tryon, *op. cit.*, p. 302; not of Carpenter or A. Adams.
Pyramidella candida Tryon, *op. cit.*, pp. 302, 373; not of Mörch or Meuschen.

Habitat. Carolina coast southward to Florida and Cuba. St. Thomas, Cuming. West Florida, low water, to 2 fms., in the sea-weed or on muddy flats, Hemphill.

The first person to observe this species was Conrad, in 1846, during his visit to Tampa, where he found it living, rare, on the shores of the bay. He named, but unfortunately did not describe it, though there is no doubt that his observations can apply only to this species. Subsequently, after being at first confounded with its precursor, the Pliocene *P. arenosa* Conrad, it was described by Holmes from the Post Pliocene, its existence in a recent state being also referred to. The differences between *arenosa* and *crenulata* lie chiefly in the more elegant sculpturing and crenulation of *arenosa*. The differences in the teeth and folds alluded to by Holmes are not constant. Subsequently, the living shell was dredged by Stimpson, at Beaufort, N. C.

The west coast representative of this species is *P. conica* C. B. Adams. A pale rosy specimen of this was apparently described a little later by A. Adams under the name of *Obeliscus hastatus*. Another beautiful color variety of this species is *P. variegatus* Cpr. (non A. Adams). These have dark and light varieties like the *crenulata*. All these and the next species have been lumped together by Mr. Tryon under the name of *P. conica* C. B. Adams. They are nearly related, but in my opinion distinct species. *P. crenulatus* has the two anterior small plaits dark brown, even in its light colored varieties. In *P. conica* they are always white like the large posterior plait, even in the darkest specimens. It is possible that the original *hastatus* A. Adams may be distinct from *P. conica*, but the specimens I have seen labelled *hastata* seemed to be merely a pale pinkish slender variety of *conica*. The *variegatus* Cpr. is elegantly marbled and mottled with brown, white, and pearl gray. There is another very delicate Californian species belonging to the typical section of the genus which does not seem to have been named. It is about 10.0 mm. long, and 4.0 mm. wide; white, with numerous golden brown dotted or hairlike spiral lines; a smooth or lightly spirally striate surface; moderately rounded whorls, about nine in number, without the usually decollate nucleus; the suture distinct but not channelled; the umbilicus reduced to a mere puncture or even absent; the pillar with one large and two anterior small folds, more transverse than in *P. conica* and stronger; fasciole obsolete; the outer lip sharp with three or four liræ in the throat. This species, which stands about midway between the two sections of the genus, was collected near the mouth of the Colorado River, at the head of the Gulf of California, by Dr. E. Palmer, and may be called *P. auricoma*. It is like *P. monilifera* on a much smaller scale.

Stimpson observed, and I have confirmed it, that the operculum of *P. crenulata* is thin and corneous, with a reniform outline. It consists of about two turns, the spiral part being very minute and within the margin. It has a median spiral double rib, and is often notched by rubbing against the columellar plaits. The animal is pale, the tentacles flat and triangular with the black eyes rather close together, between rather than on the bases of the tentacles. Below, the mentum extends in two triangular flaps, rather smaller than the tentacles. The front of the foot is also triangularly auriculate at the corners. The animal is sluggish. Stimpson could find no radula. The pale variety is probably what Mörch has doubtfully referred to "*Syrnola*" *pulchella*, which is not a *Syrnola*.

Pyramidella candida Mörch.

Obeliscus (*Longchæus*) *candidus* (Meuschen) Mörch, Malak. Blätt., 1875, p. 158.
< *Pyramidella conica* Tryon, non C. B. Adams.
? *Pyramidella Gundlachi* Dunker MS., Arango, Mal. Cuban, p. 161, 1880 (name only).

Habitat. Barbados, 100 fms., northward to the Carolina coast, in 15–200 fms., U. S. Fish Commission. Samana Bay, St. Domingo, Dall. Turtle Harbor, Florida, in 6 fms., Dr. Rush.

I have never been able to obtain a copy of Meuschen's work. It is impossible to say how much probability there is of an identification of the present shell with the poor figures of the last century. The name must stand as of Mörch. The *P. Gundlachi* of Dunker does not seem to have been described, but is probably this species. *P. crenulata* is larger, wider, with less sharply cut and less distinctly crenulated suture, and is rarely light colored, the brown columella and anterior plaits remaining dark even in pale specimens, which, like the varieties of *conica* on the west coast of America, are usually pinkish and delicately maculated with brown. *P. candida* is pure white; it sometimes has an opaque white spiral line on the middle of the whorl, and two large and one or two small liræ in the throat, usually one less than a *P. crenulata* of the same size. The specimens sent by Dr. Rush show how curiously growth takes place in the different parts. Some have a perforate umbilicus, no liræ, and a simple columella without a plait or tooth; a little later in the stage of growth the large and then the two small folds are developed on the pillar, and lastly the liræ opposite. A person without the intermediate stages would hardly dream that the toothless and the toothed shells belonged even to the same genus, though of course the folds on the pillar exist behind it and in the antecedent whorls.

Section PHARCIDELLA Dall.

In Fischer and Tryon's Manuals the section *Amoura* De Folin is referred to as constituted for *Pyramidellæ* with longitudinal spirals on the base and sides and faint transverse ribbing. But *Amoura* is merely a misprint for *Amaura* Möller, and the type is a shell which should be referred to *Syrnola* as a section, or to *Careliopsis*, if separated at all. There is really but one columellar fold, the second is merely the projection of one of the basal spirals, like those of *Triptychus*. If this misprint is to be elevated to the dignity of a section or subgenus, it should not be placed with the true Pyramidellas at all, for it evidently is but distantly related to them. But among the minutiæ of the Albatross dredgings in the Antilles I find a specimen of a genuine *Longchæus* with strong transverse plaits or ribs across the whorls, a peripheral sulcus, and the other characters as in *Longchæus*. If this is worth distinction as a section, it may take the name of *Pharcidella*.

Pyramidella (Pharcidella) Folinii n. s.

Shell small, pinkish white, eight-whorled; form much like that of *P. candida*, with a strong deep peripheral sulcus; the posterior margin of the sulcus with a strong keel, the anterior margin lower, with a faint keel; base rounded, finely spirally striate with evident incremental rugosities; space between the sutures flattish, with twenty or more strong transverse equal ribs; suture deep, channelled, not crenulate; aperture quadrate, the pillar with three folds, the outer lip with three internal liræ; the anterior teeth are oblique; there is a chink and a strong fasciole behind the pillar; the nucleus is lost. Max. lon. of shell, 5.0; max. lat. of shell, 2.0 mm.

Near Barbados, in 98 fms., sand, U. S. Fish Commission.

? Section TIBERIA Jeffreys.

Pyramidella nitidula A. Adams.

Syrnola nitidula A. Adams, Ann. Mag. Nat. Hist., p. 355, 1860.
Pyramidella (*Tiberia*) *nitidula* Jeffreys, P. Z. S. 1884, p. 363, pl. xxvii. fig. 8.
Odostomia (*Obeliscus*) *nitidulus* Watson, Rep. Chall. Gastr., p. 487, 1885.
Pyramidella minuscula Monterosato, *P. mediterranea* Monterosato, *Obeliscus sufarcinatus* Watson, and *O. tinctus* Watson, *fide* Jeffreys, *loc. cit.*

Habitat. Barbados, 100 fms. Japan, A. Adams. Mediterranean, Jeffreys, etc., 25 to 1095 fms.

This shell may not belong with *Pyramidella*. It is very near *Eulimella Smithii* except for the plaits on the pillar. I am in doubt whether Mr. Adams's first reference was not the most correct. Still, the pillar is very like that of *Pyramidella*. It is very widely distributed, both in area and depth. I cannot see sufficient reason for referring it to *Odostomia*.

Section PYRAMIDELLA s. s.

Pyramidella dolabrata Linné.

This beautiful and well known shell is found in Florida and the Antilles. I can see no sufficient reason for separating the Antillean and Indo-Pacific specimens, even as varieties. It is not among the Blake species, but has been received from the Bahamas, Key West, Cuba, Guadelupe, St. Thomas, Porto Plata, St. Martin's, Anguilla, and other West Indian localities, including the Swan Islands off Yucatan. It is the type of the genus and also of Humphrey's undescribed genus *Obeliscus*, which thus becomes an exact synonym of *Pyramidella.*

A species of *Syrnola* or *Styloptigma,* under the name of *S. turritus* A. A. Adams, has been received from H. Cuming, as from the West Indies, but this locality requires confirmation. The original locality for *S. turritus* was Japan.

Genus **TURBONILLA** Risso.

Turbonilla (Leach MS.) Risso, Hist. Eur. Mér. Moll., p. 224, 1826. Type, *Turbo lacteus* Linné.
Chemnitzia Orbigny, 1839, not 1850.
Turbonella (Leach) Gray, 1857.

Fortunately for the present completion of this Report, and owing to the use of the trawl rather than the dredge, very few of this genus were obtained. I have been collecting material for some years, and have most of the described American species represented in the collection under my charge, and beside those which I can identify there are at least fifteen, and perhaps twenty, diagnosable forms which appear to be undescribed. It is impracticable to attempt, therefore, any revision or review of the species belonging to our region in this paper.

Those who would go further are referred to Prof. Verrill's papers, Mr. Tryon's very praiseworthy account in his Manual, and the other literature on the subject. Bulletin No. 24 of the U. S. Geological Survey enumerates the species which have been mentioned in connection with the area under discussion.

Turbonilla belotheca n. s.

Plate XXVI. Fig. 7 d.

Shell white, like polished ivory, with a faint yellowish broad band behind the periphery, or all pale yellow brown fading toward the apex; nucleus lost but apparently small and smooth; remainder (fifteen) of the whorls solid, strong with a slightly malleated aspect; spiral sculpture of the finest and most delicate scratches above the periphery, not constant or prominent anywhere, entirely absent from the rounded base and obsolete on the ribs ; transverse sculpture of about twenty broad rounded ribs or waves, which disappear without reaching either suture, except on the early whorls; they are nearly straight, especially near the apex; incremental lines evident and somewhat irregular; aperture longer than wide; pillar incurved to form a single well marked plication. Lon. of shell, 14.0; lat. of last whorl, 3.0; lon. of last whorl, 4.0 mm.

Habitat. West of Florida, in 50 fms. Gulf of Mexico, at Station 32, in 95 fms. Barbados, in 100 fms.

This species recalls *T. paucistriata* Jeffreys, which is smaller, smoother, and much less strongly ribbed. It does not resemble any of the northern species dredged by the Fish Commission, and it is more solid, and has a sleeker appearance than any of the shallow-water species of our coast.

Turbonilla flavocincta C. B. ADAMS.

Chemnitzia flavocincta Adams, Contr. Conch., p. 74, 1852.

Habitat. Barbados, 100 fms. Jamaica, C. B. Adams. Samana Bay, Santo Domingo, Couthouy.

This pretty and characteristic species has not yet been collected on the coast of the United States.

Turbonilla interrupta TOTTEN var. **fulvocincta** JEFFREYS.

Plate XXVI. Figs. 2, 2 b.

Melania rufa Philippi, Moll. Sicil., I. p. 156, pl. ix. fig. 7, 1836.
Odostomia rufa Phil. var. *fulvocincta*, Jeffreys, P. Z. S. 1884, p. 356.
Turritella interrupta Totten, Am. Journ. Sci., 1st ser., XXVIII. p. 352, fig. 7, 1835.
Turbonilla rufa Jeffreys, etc.

Habitat. Barbados, in 100 fms. Massachusetts, southward on the American coast. Shediak Bay, Nova Scotia, Whiteaves. Fossil in the Post Pliocene of Wando, South Carolina.

This species is, as claimed by Jeffreys, identical with Philippi's *rufa*. The specimens pass through the same series of varieties. The form reported under this name from Nova Scotia by Whiteaves is remarkably distinct, taken by itself, but I suspect a connecting series could be obtained. *T. Riisei* Mörch is probably identical. Extremely fine, large, delicately brown banded and finely sculptured southern specimens constitute my *T. viridaria*. The forms *virga* and *punicea*, described and queried by me as varieties of *viridaria*, are distinct. I have examined many hundred specimens from all parts of the coast, and find the modifications brought about by temperature are wider and more marked than any that occur among individuals from a single locality, and usually of a different kind. The northernmost specimens will always exhibit a tendency to loss of sharpness in sculpture, a rudeness in the general aspect, a thinner shell, and thicker and darker epidermis; sometimes a marked decrease in size. Specimens far south from the metropolis of a species are apt to be smaller, more sharply sculptured, brighter colored, with a thinner or indistinct epidermis, and a tendency to abnormality about the coil of the last whorl and the peritreme of the aperture.

These small shells, when collected from a sufficiently wide geographical

April 18, 1889.

range, will tell the story quite as well as the large ones, if not better, as the small species, not living too close to the beach, have a wider average geographical range than the large ones from any depth of water. The present species affords an excellent example of this rule, and a study of its variations is most instructive.

The figure of the soft parts of this species which appears herewith is from the unpublished manuscript of Dr. Wm. Stimpson, who observed it at Charleston, S. C.; and collected specimens in Massachusetts Bay. The *Chemnitzia speira* of Ravenel figured by Holmes in his Post Pliocene Fossils of South Carolina (p. 82, pl. xiii. figs. 1, 1 a) is with little doubt a synonym of *interrupta*. The species figured by Holmes as *interrupta* is, however, probably something else.

Turbonilla curta n. s.

Plate XXVI. Fig. 7 c.

Shell waxen white, acute, with nine or ten rather inflated whorls; nucleus inflated, globose, sinistral, polished, mostly immersed; remaining whorls sculptured with (on the last whorl) about twenty-five close-set rounded ribs, extending from suture to suture, and but little curved; also a few faint lines of growth; no spiral sculpture; base smooth, except for a few lines of growth; general surface polished; aperture subquadrate; pillar slender with a faint spiral ridge; suture very distinct. Lon. of shell, 8.3; of last whorl, 2.9; max. lat. of shell, 2.75 mm.

Habitat. Yucatan Strait, 640 fms. Off Hatteras, in 15–124 fms., sand, temperature 61° F.; U. S. Fish Commission.

This shell may not be perfectly mature, but in any case is unusually short for its breadth. The figure appears slightly less acute than the shell itself, and the anterior prolongation of the aperture is due to a fracture. It differs from all the species figured by Orbigny, Jeffreys, Watson, and Verrill, and I cannot identify it with any of the unfigured species of this puzzling group.

The ridge or plica on the pillar is undoubtedly variable among individuals in some, if not all, of the species of this group. When apparently absent near the mouth it can usually be found on the pillar of the more apical whorls.

Turbonilla pusilla C. B. Adams.

Chemnitzia pusilla Adams, Contr. Conch., p. 74, 1852.

Habitat. Barbados, in 100 fms. Jamaica, Adams. Northward to the vicinity of Cape Hatteras, N. C., in 15–63 fms., sand, U. S. Fish Commission.

A single well preserved specimen of this species was obtained from the Blake collection. It seems to be rather rare everywhere.

Subgenus EULIMELLA Forbes.

Eulimella unifasciata Forbes.

Plate XIX. Fig. 11 c.

Eulima unifasciata Forbes, Rep. Ægean Inv., p. 188, 1843.
Odostomia unifasciata Jeffreys, P. Z. S. 1884, p. 351, pl. xxvi. fig. 8.
Eulimella Smithii Verrill, Trans. Conn. Acad., V. p. 538, pl. lviii. fig. 18, 1882.
Turbonilla Smithii Verrill, Proc. U. S. Nat. Mus., III. p. 380, 1880.

Habitat. Barbados, in 100 fms. Northward to the vicinity of Martha's Vineyard, in 85–120 fms., living, U. S. Fish Commission. European seas, the Mediterranean, Ægean, the Bay of Biscay, and the Azores, 30–1622 fms., Jeffreys.

Eulimella scillæ Scacchi is found in the Antilles, Florida, and North Carolina.

Section STYLOPSIS A. Adams.

Eulimella (Stylopsis) resticula n. s.

Shell extremely small and thin, with a minute upturned sinistral nucleus and eight swollen yet laterally flattened whorls. The shell is without lustre, of a waxen white, translucent, the gray mottled with black and yellow of the dried animal shining through the shell. Sculpture entirely of even fine spiral close-set microscopic grooves, covering the entire surface. Coil, as it were, pulled out and closely wound like a "stranded" rope; whorls laterally slightly compressed, but swollen in front of the suture and so having a turrited look; base elongated; aperture rounded in front, narrow but rounded behind, the margins and slightly arched pillar simple and continuous except over the body. There is no umbilical chink or depression, nor any plait on the pillar. Lon. of shell, 3.5; lat., 0.7 mm.

Habitat. Rare on the sand flats between tides at Key West, Hemphill.

A singularly frail and odd-looking little shell.

Subgenus CARELIOPSIS Mörch.

Careliopsis styliformis Morch.

Monoptygma (*Careliopsis*) *styliformis* Mörch., Malak. Blätt., XXII. p. 169, 1874.
Type of the subgenus.

Habitat. St. Thomas (Riise), Mörch. Beach, Sarasota Bay, W. H. Dall.

This curious little shell is like a minute slender but few-whorled *Turbonilla*, thin, white, with no ribs, spirally closely grooved. Watson's figure of his *Mucronalia xanthias* is a good representation of our shell, except the mouth, which is entirely different. The present species has the mouth of a *Turbonilla*. It is now for the first time reported from the United States.

This group is related to the ordinary Turbonillæ, much as *Cingula aculeus* Gould is to the species of *Alvania*, or as *Æsopus* is to *Anachis*.

Amaura (*Amoura* by err. typ.) *anguliferens* De Folin, probably, and *Jaminea Duponti* De Folin, from Mauritius, certainly, belong to this section.

? Genus **SYRNOLA** A. Adams.

Subgenus OSCILLA A. Adams.

This group was according to Tryon proposed for forms of the *Syrnola* type, with strong spiral sculpture and a single strong spiral parietal plait. I have not seen the type, or even a good figure of it, if the above statement be correct, for Adams's figure in the Thesaurus (pl. clxxi. fig. 26) shows distinctly three plaits, which are even perceptible in Tryon's copy of it (pl. lxxiv. fig. 28). Then Mörch in the Malak. Blätter (Vol. XXII. p. 158, 1875) proposes a new subgenus *Triptychus*, which is said to differ from *Oscilla* by "columella triplicata nec uniplicata." I presume that the diagnosis in the Thesaurus merely meant that there was one *strong* plait beside the two fainter ones, and the name *Oscilla* was based rather on the sculpture than the plaits. I have no doubt that *Oscilla* and *Triptychus* are synonymous, and the *O. annulata* and Mörch's *T. nivea* (my *Pyramidella ? vincta* of a later date) are even very similar species.

Oscilla nivea is found in the Florida Keys, in St. Domingo, St. Thomas, St. Martin, and Vieque. If this species be a proper representative of the group, I should feel disposed to separate it generically from *Syrnola*, for it certainly has quite peculiar characters. The strong parietal spiral thread is really the result of the basal sculpture, which enters the aperture and is overlaid with callus. The strong plait on the pillar is also coincident with a basal cord, which coils around the pillar and is much enlarged by the addition of callus. The two fainter anterior plaits are often obsolete, or nearly so. None of them have the horizontality and sharpness, like that of a screw-thread, so characteristic of *Pyramidella* proper, and yet they do not turn in with a twist like the pillar lip of *Syrnola*. The outer lip is lirate in the adult.

? Genus **PERISTICHIA** Dall.

Shell elongated, acute, many-whorled, dextral, with a small sinistral nucleus, spirally or reticulately sculptured; aperture ovate, lips thickened; columella straight, simple, without plaits; a basal cord entering the aperture on the body between the pillar and the outer lip; aperture anteriorly a little effuse, but not channelled in front of the pillar; outer lip varicoid in the adult, internally with a few very strong liræ; soft parts ?

Type, *Peristichia toreta* Dall, Florida Keys.

This genus has the spire, sculpture, and nucleus of *Mathilda;* the basal cord is like that of *Oscilla nivea;* the outer lip, though less patulous and more varicose, has something about it which recalls *Rissoina.* It is like an *Oscilla* without columellar plaits, or like a *Mathilda* with a thickened and internally lirate peritreme and rounded base. As far as one may judge from the characters of the shell alone, this genus would indicate the passage between *Mathilda* and *Oscilla;* the interrogation mark I have put before it indicates my doubt as to where it should be placed.

Peristichia toreta n. s.

Shell slender, yellowish white, thirteen-whorled; nucleus minute, glassy, set on edge, having about two turbinate whorls; spire with the suture distinct, marked by a plain or slightly undulate thread behind it; behind this is a strong nodulated spiral, with round nodules, then a little interval and two more slightly smaller similarly nodulous spirals, adjacent to each other and the suture behind them; the last whorl would show about thirty-four nodules in its circuit; transverse sculpture of elevated ridges, visible in the interspaces following the line of the nodules across the whorl; on the rounded base they appear as strong radii; base with one strong cord with a deep sulcus outside of it, and the space between it and the pillar somewhat excavated; aperture ovate, pillar straight, forming almost a right angle with the lip in front of it; outer lip with three strong internal liræ; body with the basal cord projecting, slightly covered with enamel; outer lip swollen, varicose, and whiter than the rest of the shell, its margin undulated by the external sculpture; callus joining the pillar and outer lips distinct and continuous. Max. lon. of shell, 10.75; of last whorl, 3.0; max. lat. of shell, 3.0 mm.

Habitat. Coast of North Carolina at U. S. Fish Commission Stations 2607, 2608, in 18–22 fms., sand, sixteen miles off Cape Lookout, bottom temperature 73°–78° F. Charlotte Harbor, West Florida, in 2 fms., weedy bottom, Dall. Key West, between tides, H. Hemphill.

This is an extremely elegant shell, in which the relative strength of the transverse and the spiral sculpture varies somewhat in different individuals. The sides of the spire are straight, but the whorls are distinctly marked.

The color in very fresh specimens is a milky white, more or less clouded with pale yellowish brown on the base or sides.

Peristichia agria n. s.

Shell small, conical, white, eight-whorled, beside a minute glassy nucleus of about two whorls; sculpture of, on the last whorl, one moderate spiral in front of the suture, three larger ones on the side of the whorl, the most anterior of which is covered by the suture as the whorls advance, a strong cord revolving on the base and entering the aperture midway between the pillar and outer lip, and a less prominent broad spiral between the last and the columella, which does not appear inside the peristome; these are crossed by, on the last whorl, about thirty strong narrow equal regularly-spaced cord-like riblets which are hardly nodulous at the intersections; the interstices are deep, and narrower spirally than they are axially; whorls moderately rounded and well marked; aperture rounded, waved externally by the sculpture, internally lirate; pillar concave, callous; a callus connecting it with the outer lip; base rounded, strongly sculptured, the aperture slightly varicose, but in older specimens than those before me probably markedly so. Max. lon. of shell, 6.0; of last whorl, 3.0; max. lat. of shell, 2.5 mm.

Habitat. Off Cape Hatteras, in 63 fms., sand, at U. S. Fish Commission Station 2595, bottom temperature 75°.

Florida, at Marco, No Name Key, and Key West, on grassy bottom, between low water and two fathoms, H. Hemphill.

This very lovely latticed little shell is shorter and more *Odostomia*-like than the preceding species. The sculpture is a good deal like that of *Mathilda Rushii*, but less crowded and less sharp. The specimens were all slightly less than adult, and the varicosity of the outer lip would doubtless have increased if they had continued to grow.

Order SCUTIBRANCHIATA.

Suborder RHIPHIDOGLOSSA.

Super-Family SCHISMATOBRANCHIA.

This group, like its compeer, the *Dicranobranchia* of Gray, to use the oldest of their numerous appellations, may be divided into two sections, one containing spiral shells, and the other subconical or uncoiled species. Two of the four sections referred to will possess forms provided with an intromittent male organ, and others destitute of such an organ. The spiral Schismatobranchs are generally without a verge; *Neritina* and *Helicina* were until lately the known exceptions. *Turcicula Bairdii*, *Margarita infundibulum*, and several allied forms, are now added to the list. *M. infundibulum* has also a remarkable tubular modification of the right anterior epipodial lappet, so that it serves as a conduit for the seminal product, from the short tubular verge to its destination. The conical or limpet-like Dicranobranchs are usually without a verge, but it is present in *Cranopsis*, and probably in other genera. So far, no spiral Dicranobranch is known to have a verge, and no limpet-like Schismatobranch to be without one. But our ignorance of the majority of forms is so great that no one can say how long the negative evidence will have any value. It is only within a few years that the writer has been enabled to determine these facts, which seem so opposed to our previous experience and systematic definitions. The need of investigation and the field for it, in the macroscopic anatomy of the mollusca, is so great that it is astonishing that it attracts so few students.

It is probable that *Scutellina* will prove not to have a verge, but this is not yet certain; the other families comprising this section of the super-family, *Addisoniidæ* and *Cocculinidæ*, are known to be so provided.

Family SCUTELLINIDÆ Dall.

Genus **SCUTELLINA** Gray.

Scutella Broderip, P. Z. S. 1834, p. 47. (Not *Scutella* Lam., 1816.)

Scutellina Gray, P. Z. S. 1847, p. 168. (*S. crenulata* Brod.) Dall, Am. Journ. Conch., VI. p. 239, 1871. H. & A. Ad., Gen. Rec. Moll., pl. lii. fig. 6 (*S. ferruginea*). Pease, Am. Journ. Conch., IV. 99, pl. xi. figs. 26, 27 (bad).

The genus *Scutellina* has long been of doubtful relations. I had endeavored in vain for sixteen years to obtain the soft parts in alcohol. Finally, a single specimen collected on the reefs near Key West, Florida, was sent by Mr. H. Hemphill, to whose admirable abilities as a collector naturalists generally are so much indebted. This has enabled me to correct several errors into which writers on this genus have been led, and to interpret more accurately what has been not altogether clearly written.

This group has been referred universally to the Docoglossa, to which it does not belong. It has a purely rhiphidoglossate dentition, closely related to that of *Neritina* and *Helicina*. It is set in its shell like the other rhiphidoglossate limpets *Fissurella*, *Emarginula*, etc.; that is, with the head turned away from the apex of the shell. Its gill is situated, like that of *Neritina* or *Acmæa*, on the left side above the body, and pointed to the right over the back of the neck. The anal papilla and that by which the products of the renal organ are ejected are situated exactly as in *Acmæa*. The tentacles are long and slender, the eyes well developed and placed on swellings at the outer posterior part of the tentacles. The distal end of the muzzle is expanded, semilunar, smooth, with a continuous margin a little produced at the outer corners. The mouth is small and situated in about the centre of the disk. The dental formula for the right side of the radula is $R + (\frac{1}{x} + 2 + \frac{1}{4}) + \frac{x}{1}$; x standing for the uncertain but large number of denticles on the first lateral, or of single uncini in the compound series. The central or rhachidian tooth (R) is flat, squarish, and edentulous, as in *Helicina orbiculata*.

Scutellina antillarum Shuttleworth.

Plate XXXI. Figs. 10, 11.

? *Scutellina antillarum* Shuttleworth, in Poulsen, Cat. of West India Shells, p. 14, No. 930, 1878.

The shell, the only *Scutellina* I have seen from the Gulf or Antilles, I suppose to be Shuttleworth's species. It is a small thin shell, about 8 by 6 mm.

at the base, and 3.0 mm. high. The apex is situated in the posterior fourth of the length, and has a minute dextral half-immersed spiral nucleus, whose extent is marked by a slight contraction where the conical shell begins. The anterior slope is prettily and evenly arched, the posterior slope steep and concave beneath the apex. The surface is of a brownish straw-color, the interior subtranslucent white of brilliant polish but not nacreous. The sculpture is of very numerous, fine, radiating raised lines, with minute spines or vaulted scales closely set upon them, giving a rasp-like surface; there are no regular concentric lines, but only occasional lines of growth.

I have described it thus fully as I suspect Shuttleworth's name is a mere catalogue name which has never been validated by a description or figure. At least, after very full search I have failed to find any description or reference to a description. It is not the *Patella* (*Acmæa*) *antillarum* of Sowerby and Philippi.

The chief characteristics of the soft parts are described under the remarks relating to the genus.

There is no relic of an epipodium, nor is there any intromittent organ in the (female?) specimen examined. The margin of the mantle has a minute frill or fringe of papillæ. The gill is of lamellæ, exactly like that of *Acmæa*, attached only at its base. The figure of the gill of a Polynesian species given by Pease (in the Am. Journ. Conch., IV. pl. xi. fig. 26) is doubtless erroneous, or rather an inaccurate rendering of an organ not observed minutely. It is quite possible, as stated by Pease, that the gill may be protruded at will while the animal is alive, but it would be interesting to have this observation confirmed.

The figure of *Scutellina*, given from a sketch by A. Adams in the Genera of Recent Mollusca, is correct, but the figures are turned the opposite way from the figure of the shell beside them, thus giving the impression that the animal heads toward the apex of the shell, which is an error. The shell figured as *Scutellina* in Sowerby's Manual, second edition, fig. 509, is a *Broderipia*, and not a *Scutellina*.

The final determination of the place which this genus should occupy is full of interest, and confirms my reference of *Cocculina* and *Addisonia* to the Rhiphidoglossa. There is nothing strange in the fact that the last mentioned order should have conical forms as well as spiral ones, since in other groups, such as Geophila and Limnophila of the Pulmonata, we find analogous cases. The importance of the facts here summarized are my excuse for including them in this Report, since the species in question is not included in the Blake collections.

FAMILY ADDISONIIDÆ.

Genus ADDISONIA DALL.

Addisonia Dall, Proc. U. S. Nat. Mus., 1881, p. 405, April, 1882. Jeffreys, P. Z. S. 1882, p. 673; Ib., 1884, p. 148. Fischer, Man. de Conchyl., p. 757, 1885.

Addisonia lateralis REQUIEN var. paradoxa DALL.

Plate XXV. Figs. 1 a–e.

Addisonia paradoxa Dall, Proc. U. S. Nat. Mus., 1881, p. 405, April, 1882.
Gadinia lateralis Requien, Coq. de Corse, p. 39, 1848. Petit, Cat. Moll., pp. 92, 264, 1869.
Gadinia excentrica Tiberi, J. de Conchyl., VI. p. 37, pl. ii. fig. 6, 1857. Weinkauff, Conch. Mittelm., II. p. 177, 1868. Dall, Am. Naturalist, p. 737, 1882.
Tylodina excentrica Monterosato, Not. intorn. Conch. Medit., p. 57, 1872. Locard, Cat. Moll. Mar. de France, p. 67, 1886.
Addisonia eccentros Jeffreys, P. Z. S. 1882, p. 673; P. Z. S. 1884, p. 148.
Addisonia lateralis Dautzenberg, J. de Conchyl., 1886, p. 205.

Habitat. Mediterranean. North Atlantic, both European and American shores, living in 50 to 640 fms., dead in a wider range of depth.

This curious form was not collected by the Blake. I find that most European malacologists have agreed * that Requien's very poorly described and unfigured shell is identical with Tiberi's *Gadinia excentrica.* I am in doubt as to the identity of the American and European forms. They belong without question to the same genus to whose conchological peculiarities I called attention seventeen years ago (Am. Journ. Conch., VI. p. 19, 1870). The figures, descriptions, and specimens I have seen of European origin all indicate the shell as very much smaller than our American specimens; these, when adult, average 12.0 mm. in length, which is frequently much exceeded. I do not feel justified in keeping them separated on the mere ground of size, but would suggest the question to be determined by some European naturalist who may be able to examine the dentition and soft parts. Like *Neritina*, *Cocculina*, and *Cranopsis asturiana*, this creature retains the intromittent organ which seems to have become obsolete in the majority of shallow-water Rhiphidoglossa (see Verrill, Trans. Conn. Acad., VI. p. 256, 1884).

This mollusk is well entitled to family rank, for reasons set forth in my paper above mentioned. The absence of the brush-like uncini is a remarkable character, while the remaining teeth are unmistakably Rhiphidoglossate. The presence of the verge which led my friend Dr. Paul Fischer to refer this genus to the Tænioglossa (Man., p. 757) can hardly serve that purpose now that his own *Cranopsis asturiana* is shown to possess it.

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* See Mr. Dautzenberg's excellent article above cited.

I may say here, that in several shallow-water Fissurellas I have observed what I believe to be an abortive non-functional remnant of the verge, in the shape of an elongated papilla at or near the posterior part of the right tentacle, and having nothing corresponding to it on the left side. Having found no canal in these organs, I have hesitated to mention them until my discovery of what seems to be a functional verge in *Cranopsis*.

Family COCCULINIDÆ.

Genus COCCULINA Dall.

Cocculina Dall, Proc. U. S. Nat. Mus., 1881, p. 402. Verrill, Trans. Conn. Acad., V. p. 533, 1882; VI. p. 202, 1884. Jeffreys, Triton Moll., P. Z. S. 1883, p. 393. Fischer, Man. de Conchyl., p. 841, 1885. Watson, Chall. Rep. Gastr., p. 30, 1885.

Tectura sp. Jeffreys, P. Z. S. 1882, p. 672.

Shell patelliform, not nacreous, symmetrical with an entire non-sinuated margin and a posteriorly inclined apex with a (usually deciduous) spiral nucleus; muscular impression horseshoe-shaped, interrupted over the head.

Animal with a prominent head and muzzle, the males with an intromittent organ at the base of the right tentacle; a single lamellose asymmetrical gill (resembling in form and place of attachment the gill in *Acmæa*) between the under surface of the mantle and the upper surface of the body from a point above and behind the head, extending around toward the right, and even backward on the right side; attached only at its base. Eyes wanting in the known species. Anus anterior, opening in a papilla above and behind the head. Mantle margin and sides of foot plain, without epipodial papillæ or processes, but they are sometimes present behind. Radula with a small or moderate hardly raised rhachidian tooth (the cusp in one species obsolete), three moderate inner laterals with denticulate cusps, a larger denticulate major lateral with a stout and twisted stalk, and on each side a stout base from which spring numerous slender uncini hooked at their tips. Formula $\frac{1}{x(1+3\cdot3+1)x}$. There is no jaw. The dentition resembles in a general way that of *Parmophorus* and of some species of *Helicina*.

The marked peculiarities of this group, and the discovery in the Western Atlantic, North European seas, and the Philippines, of species appertaining to it, have secured its prompt recognition from naturalists. Thus, there have been described from the Philippines, —

Cocculina angulata Watson;

from North Europe and the Northeastern Atlantic, —

Cocculina spinigera Jeffreys,
Cocculina corrugata Jeffreys,
Cocculina pusilla Jeffreys (as *Tectura*),
Cocculina adunca Jeffreys (as *Tectura*);

and from the Western Atlantic,

Cocculina Beanii Dall,	*Cocculina leptalea* Verrill,
Cocculina Rathbuni Dall,	*Cocculina conica* Verrill,
Cocculina Dalli Verrill,	*Cocculina spinigera* Jeffreys.

C. adunca Jeffreys is almost certainly the same as *C. Beanii* Dall. *Tectura rugosa* Jeffreys, described with several *Cocculinæ* under that generic name, is, however, almost certainly a young specimen of one of the varieties of *Acmæa rubella.* The specimens in the Jeffreys collection agree perfectly (although dead and bleached) with specimens of *A. rubella.*

Tectura galeola Jeffreys, which I examined through the kindness of Dr. Jeffreys, is certainly not an *Acmæa*, as the long slope is anterior. In the absence of the soft parts it must remain in a doubtful state, though possibly a *Cocculina.*

The discrepancies which have occurred in the description of the soft parts of the different species would be somewhat difficult to reconcile, were it not probable that this family contains more than a single group, on the one hand, and, on the other, that the small size of the animals renders an examination difficult and very liable to error of observation.

Thus, *C. spinigera* has been reported to be without a rhachidian tooth. But in several specimens of that species I found the rhachidian tooth (Pl. XXXI. Fig. 9) present, though very flat, translucent, and with only a trace of cusps, which last, on the younger rows of teeth, would be absent, thus leading very easily to a misconception. I have figured this tooth as observed by me in specimens sent by Dr. Jeffreys.

The observations of Mr. Watson on the gill of *C. angulata* I am not able to accept as final, and believe that some misconception is mingled with them. His description, and the position assigned to the supposed gill on "the lower right side of the neck," correspond fairly well to the position and appearance of the extended free ends of the anal and renal papillæ in *C. spinigera*, organs which, imperfectly observed, I strongly suspect to be responsible for the alleged second and right-hand gill in *Propilidium.* I have never been able to get a fresh specimen of *Propilidium* to determine this point, but the fact that every known unfissured limpet with a free gill like that of *Acmæa*, whether docoglossate or rhiphidoglossate, has that gill adjacent to the heart on the opposite (left-hand) side from the anus, is ground for a strong presumption that *Propilidium* and this particular *Cocculina* do not form exceptions to the rule.

The species of *Cocculina* may be divided into two sections characterized by the presence or absence of posterior epipodial filaments. In the typical group there are two posterior filaments. In the other there are none.

The nearest relatives of this group are to be found in the *Scutellinidæ* and the *Addisoniidæ.* It appears to be an ancient, and what Prof. Louis Agassiz would have termed a "synthetic" type.

Section COCCULINA s. s.

Cocculina Rathbuni Dall.

Plate XXV. Figs. 5, 7, 7 a.

Cocculina Rathbuni Dall, Proc. U. S. Nat. Mus. for 1881, p. 402, April, 1882.

Shell white, depressed, the slopes flattened, sides subparalleled, with slight radiating and concentric sculpture and a subcentral apex from which the nucleus is usually lost, leaving a little scar on the shell. Length, 10–13 mm.

Two female specimens examined, which had been a long time in alcohol. The mantle margin appeared plain, with a thickened border. Behind in the sinus between the mantle and the foot are two small round blunt elongated epipodial papillæ, one on each side of the median line and not very close to it. The gill is small, triangular, exactly like that of some Acmæas, and similarly placed. The head is large, the end of the muzzle flat, marginated, semilunate, enclosing a smooth space, in the centre of which is a rounded papillose area surrounding the mouth; tentacles moderate, subcylindrical, without eyes; the course of the intestine much resembling that of *Patella*, but it seems to be not so long. Rhachidian tooth with a distinct cusp.

This species was obtained by the U. S. Fish Commission in 1881, about 100 miles south and east from Martha's Vineyard, in 506 fms., green sand and mud, the bottom temperature being 40°.5. The party on the Blake obtained it at Station 288, in 399 fms., hard bottom, off Barbados, bottom temperature 44°.5; a fresh one at Station 230, in 464 fms., off St. Vincent, bottom temperature 41°.5; and living ones at Station 195, off Martinique, in 502½ fms., sand and ooze, the bottom temperature being 41°.0 F. In the latter case the animal was adhering to a small water-logged splinter.

Cocculina Beanii Dall.

Plate XXV. Figs. 2, 4, 8.

Cocculina Beanii Dall, Proc. U. S. Nat. Mus. for 1881, p. 403, April, 1882.

Shell elevated, white, the anterior slope much the longer and conspicuously arched, the posterior slope excavated concavely, the apex elevated, subposterior and much incurved, the nucleus generally gone in adults, leaving a little scar; sculpture stronger and more distinctly cancellated in some specimens than in *C. Rathbuni*, the young are more sharply sculptured than the old, and at the intersections the riblets are nodulous or even slightly spinose; the shell is smaller than in *C. Rathbuni*, reaching about 8.0 mm. in length.

Four specimens, all apparently females, were available for examination, of which two were dissected. The soft parts in general were as in *C. Rathbuni*, except that the head and muzzle are much elongated, the sinus behind the head, therefore, is deeper, the gill longer, projecting out on the right side; the tentacles are longer, and the foot proportionally shorter, than in *C. Rathbuni;* the mantle margin more puckered (by the effect of the alcohol?); the margination of the muzzle is interrupted in front by the papillose oral area, which in this species distinctly forms the end of the muzzle, the effect of which is to modify the marginated part into two lappets, one on each side, extending from the end of the muzzle to the anterior edge of the foot. In the dentition the bands of uncini are proportionally longer and wider, and the rhachidian tooth is smaller than in the preceding species.

This species was found by the U. S. Fish Commission, in 1880–81, at Stations 871, 894, 947, and 997, in 100–365 fms., muddy and sandy bottom, temperature at the bottom ranging from 40°.0 to 52°.0 F. It was obtained by the party on the Blake at Station 288, in 399 fms., hard bottom, off Barbados; Station 195, in 502½ fms., sand and ooze, off Martinique; at Station 161, in 583 fms., lava sand, off Guadelupe, bottom temperature 41°; and at Station 230 in 464 fms., off St. Vincent, bottom temperature 41°.5 F.

Section COCCOPYGIA Dall.

Foot without epipodial filaments.

Cocculina spinigera Jeffreys.

Plate XXXI. Figs. 7, 8, 9.

Cocculina spinigera Jeffreys, Triton Moll., P. Z. S. 1883, p. 393, pl. xliv. figs. 1, 1 a–c.
Verrill, Trans. Conn. Acad., VI. pp. 203, 271, 1884.

Habitat. U. S. Fish Commission Stations 997 and 2115, in 335 to 843 fms., living in the tunnels of Teredo-bored wood, associated with *C. leptalea* Verrill.

This species, obtained by Dr. Jeffreys in the Porcupine and Triton dredgings in the North Atlantic, is much smaller than either of the two preceding, or the specimens I have seen may not be fully grown, averaging only 1.5 to 2.0 mm. in length. It has the form of *C. Beanii,* so far as the shell is concerned, with the sculpture of the most strongly sculptured specimens of that species, which, as above mentioned, sometimes have minute spinose projections at the intersections of the radiating and the concentric ridges. The nucleus, however, in the specimens of *C. spinigera* examined, was constantly present, symmetrical and subspiral. Seven specimens were kindly sent me by Dr. Jeffreys for examination, with the soft parts, comprising four males and three females. The soft parts of the females agreed in all particulars with those of *C. Rathbuni* except that the pair of epipodial posterior papillæ was wanting, as also in the males; the tentacles seemed to be somewhat stouter and shorter; the gill was very short and triangular, in its usual position, and the anal papilla was prolonged into a kind of free tube, one half longer than the gill itself.

The dentition resembles that of *C. Rathbuni* in all essential particulars, except that the rhachidian tooth, instead of having a comparatively small base and a distinct and well developed cusp, has a large base, which is thin and of rounded shape, with an almost obsolete cusp. Many of these teeth could hardly be said to be cusped at all, and in the best developed unworn ones the cusp is but little raised, small, composed of a median rounded portion and on each side of that a single obscure denticle (see figure). The whole tooth, in most cases, resembled a mere thin scale, and might readily be overlooked, or regarded as not a true tooth at all, in some specimens.

The most extraordinary feature is peculiar to the males, of which four specimens were examined and agreed perfectly with one another. The right tentacle is somewhat stouter than the left one, but near the base on the outer side both have a distinct bulb or elbow-like prominence similar to that which in many gastropods bears the eye. A careful examination of sections, however, did not disclose any nerve, rods, or optic cup, and it is certain, if the last exists, that it is unprovided with any pigment cells. The cutis seemed of a uniform and rather unusual thickness, partly due, probably, to the contraction caused by the alcohol. The tip of the contracted right tentacle was rather broad and blunt; it also seemed somewhat flattened. From the outer side projected a verge of tentacular form, more slender, slightly longer, and more flattened than the tip of the true tentacle, and horizontally recurved. From the circular wrinkles caused in it by contraction it seemed capable of much elongation. In the anterior edge near the tip, but not extended over the tip, was a deep fissure extending to the centre of the organ and along its anterior edge from the tip backward a distance a little more than equal to the width of that part of the organ. The proportional length of this fissure differed in different individuals a little. From the depth of this fissure a tube or canal extends through the centre of the penis, its diameter being about one sixth that of the organ. At a point in this canal not far from the junction of the verge with the tentacle there appears to be a subtriangular fossa, from which the tube continues toward the body at about the same distance from the inner surface of the verge, and of about the same size as before the fossa was reached. The canal passes on into the base of the tentacle, where it is lost to sight in the solid opaque tissues. The extremely small size of the animal combined with its coarse, and (by alcohol rendered) very opaque tissues, prevented the more thorough examination which would have been practicable with fresh specimens or those of larger size. Nevertheless, it does not appear that this organ can be anything else than an intromittent male organ, such as is now known to exist in *Addisonia*, in *Neritina*, in some species of *Cranopsis*, and other deep-water Rhiphidoglossa.

At the time I made this discovery the only form in which an external intromittent organ had been reported among the Rhiphidoglossa was *Neritina*, and even this fact, though easily verified, had been questioned.

The verge in the *Neritidæ*, however, is broader and rounder, flatter, and shorter than in *Cocculina*, and shows its nature less clearly in its external appearance. If the function of the organ be still denied by some sceptic who will not be satisfied until the animals have been observed *in copula*, it remains that, whatever its function, here is an organ unknown in the great majority of Rhiphidoglossa, but which appears in a few diverse deep-water forms.

These interesting facts were made known by me to Prof. Verrill, Dr. Jeffreys, and others interested, in the early part of 1882. Subsequently, the same organ was observed in *Addisonia*, and, while closing up my work on this Report, an examination of a male *Rimula* (*Cranopsis*) *asturiana* Fischer added it to the list, still later enlarged by species of *Margarita* and *Turcicula*.

These results show very clearly how much there is still to learn about the macroscopic anatomy of even ordinary mollusks; how little ground there is for dogmatism in the larger features of classification; and how rich a field is open to the conscientious student who may have access to the sea.

The old idea, still delusively cherished by most embryologists, that the characteristics of a single species may serve to marshal a host of others in line, was always false, and every year shows its falsity more clearly.

The marshalling must be allowed for convenience' sake, but the idea that it is in any proper sense a finality should be discouraged by every teacher. If it had not been taken for granted these many years, who can doubt that we should long since have known exactly about a hundred species of mollusks where we now have the facts about one or two, and that our classifications would have been ameliorated in proportion?

This species must be very abundant in the North Atlantic, as Dr. Jeffreys has informed me that he has examined over four hundred specimens.

One feature which is often noticeable on the sedentary deep-sea shells, and especially on the limpets, is perhaps worth mentioning. A sort of spongy organism, apparently a sponge or a hydractinian, often covers the upper surface with a coating of fine straight spinules, which appear to be attached to the shell but are easily removed by wetting and rubbing. They are very abundant on *Terebratulina Cailleti* and other sculptured brachiopods, and I have observed them on all the species of *Cocculina* and on *Lepetella*. Dr. Jeffreys states that the spinules are not soluble in potash. There has been no distinct outer crust, nor any particular shape, to the aggregations of this sort which have come under my notice, but they seem to be preferably attached to prominences of the sculpture, and might easily be mistaken, in some cases, for part of the shell itself.

This *Cocculina* has fine sharp spines, properly belonging to the shell; but among those in the Jeffreys collection I have seen none quite as sharp and long as those in the magnified figure (1 a) of the plate to Dr. Jeffreys's paper on the Triton mollusks.

The section *Coccopygia*, to which I have referred this species, probably includes *C. angulata* Watson, and other species which have not yet been critically examined with regard to the epipodial filaments.

FAMILY PHASIANELLIDÆ.

Genus PHASIANELLA LAMARCK.

Section EUCOSMIA CARPENTER.

Phasianella (Eucosmia) brevis ORBIGNY.

Plate XIX. Fig. 10 b.

Phasianella brevis Orbigny, Moll. Cuba, II. p. 79, pl. xx. figs. 19–21, 1842. Not *P. brevis* C. B. Adams.

Habitat. Cuba and Martinique, Orbigny. Station 21, off Bahia Honda, in 287 fms., Blake Expedition. Off the coast of North Carolina, in 15–63 fms., bottom temperature 75°.0 F., at Stations 2595, 2596, 2597, 2612, 2615, 2619, U. S. Fish Commission.

The *P. brevis* of C. B. Adams is merely a young specimen of the shell he had previously named *Turbo pulchella,* which is a very pretty form of *Phasianella* with rather marked spiral sculpture and a flattened nucleus. It has the usual operculum of the genus. Other species recognized during this investigation as occurring in the Antillean region, but not obtained by the Blake, are *P. affinis, tessellata, concinna,* and *concolor* of C. B. Adams, and *umbilicata* of Orbigny. There are several other nominal species requiring further study.

FAMILY TURBINIDÆ.

Genus LEPTOTHYRA CARPENTER.

Leptonyx Carpenter, and A. Adams, Proc. Cal. Acad. Sci., III. p. 175, Nov., 1864. Not *Leptonyx* Gray, 1837, gen. *Phocidæ.*

Collonia Philippi, Handbuch d. Conch., p. 206, not of Gray. Not *Collonia* Gray, 1852. (Type, *Delphinula marginata* Lam.)

Leptothyra (Carpenter MS.) Dall, Am. Journ. Conch., VII. p. 130, 1871. (Type, *Turbo sanguineus* Linné.) Pilsbry, Tryon Man., X. p. 245, 1888.

Collonia (sp.) H. & A. Adams, Gray, Watson, etc.

The genus *Collonia* of Gray, according to Dr. P. P. Carpenter, was founded on the *Delphinula marginata* of Lamarck, a smooth Grignon fossil with large crenate umbilicus. It was defined as having an "operculum circular, with many gradually enlarged whorls, with a convex external rib and central pit." Afterward the genus fell into great confusion from the confounding of names of totally distinct species called *marginata*, etc., all of which may be found particularly detailed in Dr. Carpenter's paper above referred to. There he proposed the name *Leptonyx* for the group typified by *Turbo sanguineus* Linné, which had been erroneously confounded with *Collonia* by several authors. This *Turbo sanguineus* is a species found in the Mediterranean, with near relatives in Japan and Californian waters. It has a few-whorled rather solid smooth discoid shelly operculum a little concave externally, no umbilicus when adult, and a rounded base. The name *Leptonyx* having been used twice for Vertebrates before Dr. Carpenter took it up, I substituted *Leptothyra* * with his permission, as above cited, in 1871. A further confusion was created in regard to the type species by a supposition that the operculum of the Californian shell was different from that of the Mediterranean. This idea was totally erroneous, but found its way into several publications, among others Tryon's Manual (II. 312). The opercula are precisely alike, having a porcellanous coating, a little thicker at the edges than toward the centre, especially in old specimens, and having the general form of a coin or disk (not of a lens) based on a horny substratum, as in the typical Naticas. The operculum has about five to seven turns, visible best on the inner side. The young shells have a pit, or even a perforation, in the umbilical region, but this is entirely effaced in the adult, unless *L. Philipiana* is an exception.

L. sanguinea is not yet known from the east coast of America. We have, however, beside *L. induta* and what I regard as its varieties, two other species, *L. Philipiana* and *L. Linnei*, now for the first time described.

A shell which I find in the Jeffreys collection marked "*Turbo carinatus* Cantraine, Travailleur Exp., 1882," is a remarkably fine species of *Leptothyra*, larger than any other known to me. *Turbo mammilla* of the Reggio Tertiaries, as identified by Prof. Seguenza, is also a *Leptothyra*, and so probably is *Turbo filosus* Philippi of the Italian Tertiaries.

Leptothyra induta WATSON var. albida DALL.

Plate XXXVIII. Fig. 6.

Leptothyra induta Dall, Agassiz, Three Cruises of the Blake, II. p. 69, fig. 287, 1888.
Leptothyra (*induta* var.?) *albida* Dall, Bull. M. C. Z., IX. p. 48, 1881.
Turbo (*Collonia*) *indutus* Watson, Journ. Linn. Soc., XIV. p. 715, 1879; Chall. Rep. Gastr., p. 128, pl. vi. fig. 1, 1885.

Habitat. Sand Key, in 15–128 fms.; Station 2, in 805 fms.; Sigsbee, off Havana, in 450 fms.; off Cape San Antonio, in 1002 fms.; Yucatan Strait, in 640 fms.; Station 5, in 152–229 fms., soft coral ooze, bottom temperature 50°; Station 100, off Morro Light, Havana, in 250–400 fms.; Station 211, off Martinique, in 357 fms.; Station 218, off Santa Lucia, in 164 fms., bottom temperature 56°.0. U. S. Fish Commission Station 2662, off St. Augustine, Florida, in 434 fms., gray sand.

Variety *tincta* Dall, shell rosy.

Variety *insculpta* Dall. Ridges obliquely cut by the radiating sculpture which nodulates them all, and extends entirely over the shell; basal ridges more numerous (six), close, and slightly but distinctly sculptured by the radii.

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* The name *Homalopoma* was under consideration by Dr. Carpenter as a substitute for *Leptonyx*, but was never published by him.

April 24, 1889.

None of our specimens have the body whorl smooth like the Challenger specimen, and none are quite so pointed as Watson's figure. Still, I have very little doubt that his is an abnormally smooth specimen of the same species as that which I have called *albida*. If they are distinct, ours will be *Leptothyra albida*, and his *Leptothyra induta;* for there cannot be a shadow of a doubt that they all belong to the group of *L. sanguinea*. I have not been able, of course, to compare specimens

The fact of the existence of the group, apparently abundant, in deep water, and the other fact of the wide distribution of the shallow-water types of the genus, are points which march together in this case as in many others, and have an obvious significance.

Leptothyra Philipiana n. s.

Plate XXIV. Figs. 7, 7a.

Shell whitish, of four rounded whorls and a minute smooth nucleus; rather depressed, base rounding into the rest of the whorl. Sculpture of ten even strong spiral costæ, with channelled interspaces, here and there toward the aperture indications of intercalary hardly raised spirals, and over all faint spiral striæ more or less visible under a lens. Radiating sculpture faint, the tops of the spirals are a little undulated, and two close to the umbilicus are indistinctly nodulous, otherwise there are only the usual incremental lines. Operculum as usual; umbilicus perforate, rather profound ; aperture prolonged above, edges a little flaring, subcircular. Alt. 3.5, diam. 4.0 mm.

Habitat. Station 192, near Dominica, in 138 fms., bottom temperature 63°.0 F.

This shell may not be quite adult, and the umbilicus may be closed later. It has a different shape from any of the varieties of the preceding which have come under my notice, and is much smaller.

Leptothyra Linnei n. s.

Plate XXXIII. Fig. 9.

Shell small, white, solid, elevated, blunt, with five well rounded whorls; spiral sculpture of about sixteen even rounded costæ, separated by wider interspaces, with an occasional intercalary thread; the two nearest the suture are generally more or less beaded by the radiating sculpture, the rest usually plain; spiral sculpture of close oblique radiating lines coincident with the lines of growth, with at regular intervals more emphasized depressions which nodulate the upper spirals and in rare instances are produced all over the shell ; the costæ are more or less nodulated or even imbricated at the intersections, so that in extreme cases (var. *limata*) the shell is as rough as a file all over; base full and rounded, umbilical depression or perforation occasionally present in the young, wholly absent in the adult; aperture rounded, the upper part produced and depressed about the width of two or three spirals with their interspaces. Operculum as usual. Alt. 5.5, diam. 5.0 mm.

Habitat. Station 2, in 805 fms.; Station 20, in 220 fms.; Station 220, near Santa Lucia, in 116 fms., rocky bottom, bottom temperature 58°.5 F. Off Havana, in 450 fms., Sigsbee. Barbados, in 100 fms.

This pretty little species is like a *L. albida* in miniature, with proportionally finer and more numerous spiral costæ, a rounder base, and an aperture bent downward in the adult.

A full-sized *L. albida* measures 8.0 mm. high by 7.75 in maximum diameter of the base.

The variations of *L. Linnei* are parallel with the variations of *L. albida* (or *induta*), the var. *limata* of the former corresponding to an intensified state of *induta* var. *insculpta*. I have, however, not seen any pink variety.

FAMILY TROCHIDÆ.

Genus GAZA WATSON.

Gaza Watson, Journ. Linn. Soc., XIV. p. 601, 1879; Chall. Rep. Gastr., p. 93, 1885. Type, *Gaza dædala* Watson, *loc. cit.*, p. 601, 1879; Chall. Rep., pl. vii. fig. 12.

Gaza superba DALL.

Plate XXII. Figs. 4, 4 a.

Callogaza superba Dall, Bull. M. C. Z., IX. p. 49, 1881. Agassiz, Three Cruises of the Blake, II. p. 68, 1888 (fig. excl.).

Habitat. Station 153, off Montserrat, in 303 fms., lava sand, bottom temperature 48°.75 F.; Station 129, off Santa Cruz, in 314 fms., gray ooze, bottom temperature 48°.5; Station 274, off Barbados, in 209 fms., fine sand and ooze, bottom temperature 53°.5; Station 275, off Barbados, in 218 fms., fine sand, bottom temperature 52°.5; Station 281, off Barbados, in 288 fms., ooze, bottom temperature 46° 5. Also by the U. S. Fish Commission in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Florida, Lon. 88° 16′ W., in 324 fms., gray mud, bottom temperature 46°.5

I included this species with the subgenus *Callogaza* in my preliminary paper, but the receipt of more specimens from the U. S. Fish Commission dredgings leads me to doubt whether the umbilicus always remains uncovered, and though I have seen no specimens in which it was wholly closed, yet I suspect it becomes so at times. An adult specimen measures 40.0 wide by 32.0 mm. high, and this appears to be about the average of the species.*

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* Another species of about the same size (38 × 24 mm.), *Gaza Rathbuni* Dall, which differs from *G. superba* in being more depressed, with stronger spiral grooving, a slightly smaller umbilicus, and more flattened over the sutures, has since turned up among the Albatross collections, dredged in the Pacific, at Station 2818, in 392 fms., sand, temperature 44°.0 F., near the Galapagos Islands.

An examination of the soft parts showed the operculum to be very thin, light brown, and with about seven whorls. The animal was of a whitish color without any spots or markings, and with very large black eyes set on a good-sized peduncle closely adjacent to and behind the tentacles. There is a single narrow gill in the usual position. The tentacles are long, large, and rather slender; the foot short, broad, and bluntly rounded in front, behind almost truncate, in fact the contracted specimen looked almost as if there was a broad posterior indentation in the middle line. The muzzle is long, narrow, subcylindrical above and transversely expanded at its distal end, which is semilunar with a densely papillose surface and fringed edges. This expansion is nearly three times as wide as the stem of the muzzle. Epipodium with a large lobe behind the eye peduncle but not connected with it; behind the lobe is one long process and then a shorter one. The frill behind is merely puckered, but from under the borders of the operculum on each side protrude three good-sized processes. Behind the opercular lobe the epipodium terminates in a prominent point, concave and papillose on its upper surface. There are no frontal lobes between the tentacula. The epipodial point extends some distance behind the posterior end of the foot. The jaw is like that of *Calliostoma* in shape, composed of brown four-sided translucent prismatic rodlets which give under the microscope a reticular marking of diamond-shaped spots to the surface of the jaw; the two sides are not united in the middle line. The dentition closely resembles that of *Lunella versicolor* Gmelin as figured by Troschel (Geb. der Schnecken, II. pl. xx. fig. 1), except that the bases of the rhachidian and lateral teeth are subcircular, and on a few of the scythe-shaped cusps of the numerous uncini are a few denticles. There are five lateral teeth, and between twenty and thirty uncini.

The nucleus in this species is often caducous, and in such specimens the apex is pierced with a circular perforation a millimeter and a half in diameter, which is continuous with the umbilicus. There does not appear to be any particular difference in appearance between the nucleus and the early whorls, its loss would therefore seem to be due merely to its fragility. In none of those in which it remains is there any indication of its being reinforced by a shelly deposit.

Gaza Fischeri n. s.

Plate XXXVII. Fig. 6.

This shell is of six and a half whorls, and closely resembles *Gaza dædala* Watson, except in the following particulars. It is much more depressed proportionally ; the upper margin of the aperture is distinctly depressed below its general plane; and the radiating lines, almost microscopic in *G. dædala*, are in this form impressed in the early whorls near the suture, so as to produce a succession of short ripples, following the recurved lines of growth, which give a fringe-like ornamentation to the suture, at the rate of about five ripples to a millimeter. Nothing like this is visible in any of the specimens of *G. superba*. The margin of the suture in this form is distinctly appressed, forming a narrow border. The operculum has about seven whorls. The umbilicus is completely floored over. The soft parts are like those of *G. superba,* but the tentacles are shorter and stouter, the lateral lobes of the epipodium proportionally larger, there is one more lateral process, and the muzzle is not so much expanded laterally at its termination. Max. diam. of base, 25.0; min. diam., 20.0; alt., 16.0 mm.

Habitat. Station 221, off Santa Lucia, in 423 fms., gray ooze, bottom temperature 42°.75 F.

We know so little about the limits of variation in this beautiful group that it is with some doubt that I apply a name to these specimens. The difference in form and sculpture, and the distance between Fiji where *G. dædala* was collected and the Antilles has seemed to me sufficient warrant in this instance.

The species is dedicated to Dr. Paul Fischer, who by his recently published Manual has laid malacologists under serious obligations.

Subgenus CALLOGAZA Dall.

Callogaza Dall, Bull. M. C. Z., IX. p. 49, 1881. Type, *C. Watsoni* Dall, *loc. cit.*, p. 50.

When I first proposed this name I thought it of generic value, now I am disposed to reduce it to the rank of a subgenus. The opportunity of studying a larger number of specimens has led me to modify my ideas of the value of some of the characters. Thus the mucronation so marked in the type specimen of *Gaza* is due to the impinging on the reflected lip of the angle of the umbilical carina. This I find may produce mucronation, or be invisible under the labial callus in different individuals of the same species, and probably in the same individual at different times. The crenate border of the umbilicus in the type is of more importance, and leads the way toward *Microgaza*, which appears to lack a reflected lip. I regard *Gaza* and its subgenera as a group of *Trochidæ*, related to *Lunella* of the *Turbinidæ* on the one hand, and *Umbonium* on the other.

Information as to the soft parts will be found under the data for the several species. When other species are examined, the common characters which alone belong to the generic or subgeneric diagnosis can then be eliminated for that purpose.

Callogaza Watsoni Dall.

Plate XXII. Figs. 7, 7 a. Plate XXIII. Figs. 1, 1 a. Plate XXIV. Figs. 2, 2 a.

Callogaza Watsoni Dall, Bull. M. C. Z., IX. p. 50, 1881.
Margarita filogyra Dall, *loc. cit.*, p. 42 (young shell)

Habitat. Sigsbee, Station 12, in 177–200 fms., off Havana, Cuba. Station 20, in 220 fms., off Bahia Honda, Cuba, bottom temperature 62°.0. Yucatan Strait, in 640 fms. Station 273, off Barbados, in 103 fms., broken shell and coral, bottom temperature 59°.5. Station 282, off Barbados, in 154 fms., sand, bottom temperature 56°.0. Station 296, off Barbados, in 84 fms., hard bottom, bottom temperature 61°.5 F.

The shell named by me *Margarita filogyra* is without doubt in part based on young specimens of *Callogaza Watsoni*. But with regard to some of the others I am yet puzzled as to whether to so refer them or not. In any case, the weight of probability is in favor of their being eventually united. There are certain differences in the umbilicus to which I do not, in the absence of soft parts, feel able to give a definite value; while the fact that these specimens have a slightly but distinctly thickened lip adds to the obscurity. At all events, whether wholly identical with *C. Watsoni* or not (Figures 1, 1 a, Plate XXIII., certainly are), the *M. filogyra* is in an uncertain state, and for that reason I prefer to omit the name in my list of established species until I obtain more definite material for study. I retain the figures which had been prepared of the supposed young shells.

An adult specimen affords the following notes. The body is yellowish, the sides streaked with ashy gray, a few flecks of which also appear between the tentacles. The body is longer than in *Gaza* proper and distinctly pointed behind. The tentacles are short and stout, with a small inner angle or expansion opposite the distinct eye peduncle, which bears a large, very black eye. The muzzle is proportionately shorter than in *Gaza*, subcylindrical, granulose at the end, but not laterally expanded. The gill as in *Gaza superba*, but broader in proportion to its length. The very large anterior lobe of the epipodium is followed by seven gradually decreasing lateral processes, of which five are under the operculum, and are separated by small rounded lobes of the epipodial margin. The posterior angle of the epipodium is pointed as in *Gaza*, extending considerably beyond the operculum, but not as far as the foot. The dentition differs considerably from that of *Gaza*. It most nearly resembles that of *Förskalia declivis* Förskal, as figured by Troschel (Gebiss d. Schneck., II. pl. xxiv. fig. 14). The rhachidian tooth has a single three-pointed cusp, without the accessory denticles of *Förskalia*, the laterals have two or three accessory denticles, the uncini, unlike *Förskalia*, are denticulated all along the inner edges of their blade-like cusps, except toward the margin of the radula, where they gradually become simple. It will be observed that in the soft parts there are features which sufficiently distinguish this group from *Gaza*, according to ordinary standards.

Subgenus MICROGAZA Dall.

Microgaza Dall, Bull. M. C. Z., IX. p. 50, 1881. (Type, *M. rotella* Dall.)

Microgaza rotella Dall.

Plate XXII. Figs. 5, 5 a.

Microgaza rotella Dall, Bull. M. C. Z. IX. p. 51, 1881.

Habitat. Barbados, in 100 fms. Station 2, in 805 fms. Station 20, off Bahia Honda, Cuba, in 220 fms., bottom temperature 62°.0. Station 290, off

Barbados, in 73 fms., coral and shell, bottom temperature 70°.75. U. S. Fish Commission Station 2602, in 124 fms., sand, thirty-six miles S. ½ W. from Cape Hatteras, North Carolina, bottom temperature 61°.0 F.

The operculum is like that of *Gaza*, and has six or seven whorls. None of the specimens show any tendency to a reflected lip, yet it is, of course, possible that no completely adult specimen was obtained. The animal has a short stout foot, bluntly rounded at either end. It is of a pinkish tint. The tentacula are very long and the eyes large. The muzzle is rounded and not very long, its extremity plain. There are no frontal lobes. The epipodium has a very small anterior lobe with a cirrus behind it, then a space without cirri, a long process just in front of the opercular disk, and one, shorter, under it on each side, making three in all. There is no posterior point to the epipodium, and only the above three cirri on each side. The jaw is somewhat like that of *Umbonium*, but shorter and broader. The radula, however, bears no resemblance to that of *Umbonium* (*Rotella* Lam.). The teeth are very elegant. The rhachidian tooth in general form (except the cusp) not unlike that of *Calliostoma granulata* Born (Troschel, II. pl. xxiv. fig. 18), but the central spur of the cusp is long and slender like a stiletto, extending considerably behind the posterior edge of the base of the tooth. On each side of it are four stout sharp rather short denticles, radiating as from the median point of the front edge of the cusp. The laterals recall those of *Gibbula divaricata* (Troschel, *loc. cit.*, fig. 6), but have more, larger, and stronger denticles, all on the posterior edge of the cusp, or the edge away from the rhachis. The uncini are rather few in number, the cusps sword-shaped, sigmoid, the inner ones denticulated on both edges. The number of laterals is five. The radula as a whole is very short and small.

The depressed form and marginated suture, as well as the kind of coloration, in this shell recall *Umbonium*. The texture of the shell and the character of its umbilicus are precisely as in *Callogaza*. The soft parts indicate its place to be in that vicinity. Until a larger number of the myriad of species shall have been examined, it is evident that the characters of the dentition in their classification cannot be formulated except in a provisional manner.

Trochus solarioides of Seguenza, from the Reggio Tertiary, seems to be a *Microgaza*.

Genus **UMBONIUM** Link.

Umbonium Link, Beschr. Rostock Samml., 1807, p. 136.
Rotella Lamarck, 1822.
Helicina Gray (non Lamarck), 1847.

After a careful examination of the literature, I see no reasonable ground for the assertion of Gray (P. Z. S. 1847) that *Helicina* of Lamarck (1801) was identical with his *Rotella* of 1822, or different from his *Helicina* of 1822, such as we are accustomed to understand by the latter name. The original diagnosis of *Helicina* did not mention any type (Prodr., 1799). There is no doubt, however, that Link's name, which was properly defined, takes precedence.

This genus has hitherto been unknown from the Antilles, the species referred to it belonging to *Teinostoma* and allied groups. I have therefore much pleasure in introducing here a description of a genuine *Umbonium*, dredged by the Fish Commission in the Antillean region, near the Florida reefs, and obtained by the Blake near Havana.

Umbonium Bairdii n. s.

Plate XXI. Figs. 6, 6 a.

Shell small, depressed conic, white, polished, externally porcellanous, internally slightly nacreous; nucleus globular, dextral; whorls five or more. Radiating sculpture of occasional faint impressed incremental lines; spiral sculpture of occasional microscopic striæ, and a single strap-like band appressed to the suture, and bearing numerous flattish squarish nodules or elevations, which coronate the whorls; periphery rounded, base rounded, depressed in the centre, which is nearly filled with a mass of white callus having a very finely granular surface. Aperture ovate, margin simple, thin, oblique. Alt. of axis, 3.5; max. alt. of shell, 4.0; max. diam. of base, 5.0 mm.

Habitat. Florida reefs, in about 200 fms., coral bottom, U. S. Fish Commission, 1886. Yucatan Strait, 640 fms., Blake Expedition.

The specimen is not quite adult. The granular surface of the callus is common to the young of other species, and is lost in the adult. The soft parts were absent. It is named in honor of the late Prof. S. F. Baird, U. S. Fish Commissioner.

Genus VITRINELLA C. B. Adams.

A group of small shells, several forms of which were comprised by C. B. Adams under the name of *Vitrinella* in February, 1850, still remain in need of further elucidation. As originally constituted, the genus was heterogeneous and no type was named. In 1853, A. Adams (P. Z. S. 1853, p. 183) described a genus *Teinostoma* (type *T. politum* Adams), of which a species had been referred to *Vitrinella* by C. B. Adams in his Panama catalogue. Another somewhat peculiar species was described by C. B. Adams as "*Neritina?*" *anomala*, and was afterward referred to a section of *Teinostoma* by A. Adams under the name of *Calceolina*. At the same time (P. Z. S. 1853, p. 189) Messrs. H. & A. Adams described a genus *Ethalia* for minute glassy shells related to *Teinostoma*, but having an umbilical pit or perforation, no large polished callus, but the anterior end of the columella lip thickened and squeezed down near to and sometimes over the umbilical region. This genus *Ethalia* would include two species of the five originally described as *Vitrinella* by C. B. Adams. This would leave to bear the name of *Vitrinella* such forms included in the original list of C. B. Adams as had a free open umbilicus and a peculiar nucleus, as described by Carpenter (Mazatlan Shells, p. 237), and one of this sort (*V. valvatoides* C. B. Adams) was selected as an example of the genus by H. & A. Adams (Gen., I. p. 434, June, 1854), and may be regarded as the type of the genus as revised by the brothers Adams. Of course, if these forms were found eventually to belong to *Adeorbis* or *Cyclostrema*, the name *Vitrinella* would have to fall back upon *Ethalia*, and the latter would become a synonym of it, for a subsequent author could not be permitted to engineer his predecessors' generic names out of existence by appropriating the valid parts for new groups of later names, and leaving the residue to fall into synonymy. But it is probable that *Vitrinella*, as above constituted, does form a valid group, and we shall so consider it, though uncognate species may have been referred to it.

For present purposes I shall adopt the following arrangement of the others.

Genus **TEINOSTOMA** Adams.

Subgenera *Teinostoma* s. s.
Pseudorotella Fischer.
Ethalia H. & A. Adams.
Dillwynella Dall.
Discopsis De Folin.

In July, 1857, Dr. Paul Fischer proposed the name of *Pseudorotella* for *Teinostoma semistriata* Orb. sp., which may be retained as a section for those species having an oval aperture. *Parkeria* Gabb is a synonym.

? Genus **COCHLIOLEPIS** Stimpson.

In January, 1858, Dr. Stimpson (Proc. Bost. Soc. Nat. Hist., VI. 308) proposed a new genus for a curious little shell found parasitic under the scales of a large annelid (*Acoëtes lupinus*). This little mollusk, with peculiar anatomical characters and a shell like a minute vitreous *Sigaretus*, is probably allied to *Vitrinella*, and was named *Cochliolepis parasitica*. A second species, larger and fewer whorled, has strong spiral striæ like a minute *Sigaretus perspectivus*, and was named *C. striata* by Stimpson in his manuscripts. It is about 6.5 mm. in greatest diameter, and 1.5 mm. high. It has two whorls and a globular nucleus almost enveloped above by the last whorl, and a very wide pervious umbilicus. Colonel Jewett collected it at Egmont Key, near Tampa, Florida. The original type of *Cochliolepis* is found in the South Carolina Post Pliocene, and by an unfortunate error was figured by Holmes as a new species, under the name of *Adeorbis nautiliformis*. The species figured in his work as *Cochliolepis parasitica* is a probably new species of *Vitrinella*, which may be named *V. Holmesi*, and the "*Angaria*" *crassa* figured on the same plate appears to be an *Ethalia*.

It is certain that *Adeorbis* does not belong in this vicinity, though the shells occasionally present a great resemblance to species of *Vitrinella* and some Ethalias. But when the species are all definitely allotted their proper place from a complete knowledge of their characters, there can be no doubt most of these discrepancies will be cleared away.

There are a number of species of these small forms on the eastern coast of the United States, in addition to the probably large number, some of which have been described, which inhabit the Antilles. Thus we have *Ethalia multistriata* Verrill, extending from Dominica to North Carolina; *E. reclusa* Dall, found on the coasts of Yucatan and North Carolina; *E. suppressa* Dall, West Florida, *E. solida* Dall, from Cuba, also probably Floridian; *Teinostoma* (*Pseudorotella*) *semistriata* Orbigny, Key West; *T. cryptospira* Verrill, North Carolina; *Vitrinella multicarinata* Stimpson, North Carolina; *Cochliolepis parasitica* Stimpson, South Carolina; *C. striata* Stimpson, Florida; *Adeorbis Beaui* Fischer, Florida; *A. naticoides* Dall, North Carolina; and *A. supranitida* Wood, with its varieties, from the whole Atlantic coast south of Cape Cod. *Trochus cancellatus* Jeffreys is probably a *Cyclostrema* or *Adeorbis*, instead of a *Machœroplax* as he suggested. We have it from 1000 fathoms, off the coast of Yucatan. *Tharsis* Jeffreys is, from an examination of the typical species, nothing more than a synonym of *Ethalia*, as here understood, or at most a feebly characterized section of *Ethalia*.

Subgenus ETHALIA H & A. ADAMS.

Ethalia reclusa n. s.

Plate XXVIII. Figs. 7, 8.

Shell small, when fresh vitreous transparent white, of three visible whorls, the last much the largest, smooth and polished above, or with only faint incremental lines below; periphery rounded, spire and base moderately rounded; margin of last whorl appressed at the suture so that the thin edge runs up over the preceding whorl and the real suture is almost invisible in fresh specimens; the outline of the preceding whorl being visible through the shell, the appearance of a suture is presented much nearer the periphery than the suture really is. Aperture nearly circular, oblique; the columella thick, appressed ; umbilical callus sparse, not polished, in adolescent specimens not quite complete. Alt. 1.0, max. diam. 2.1 mm.

Habitat. Yucatan Strait, 640 fms. Coast of North Carolina, in 12 to 63 fms., U. S. Fish Commission, on sandy and gravelly bottom, in the warmer area.

This species is nearest *Ethalia diaphana* Orbigny, so far as the base is concerned, but resembles *E. anomala* Orbigny in its upper surface, and was inadvertently referred to that species in my Preliminary Report (Bull., IX. p. 52). It has, however, a more elevated shell and a proportionately larger last whorl, while *E. anomala* has no basal callus over the umbilicus.

Ethalia suppressa n. s.

A singular little species which I have called *E. suppressa* is found on the adjacent coast of Florida. It is white, extremely small (1.75 × 0.75 mm.), flattened above and below, and a little excavated toward the periphery, where are three sharp strong keels with deep sulci between them. The umbilicus is small but open, with a carinal thread; the mouth subcircular, prolonged into a little channel at its upper junction with the body, and with a broad appressed columella. There are three and a half whorls, the suture is indistinct, but marked by a ridge which results from the apertural channel close to it. There is also an indistinct ridge on the flattened top of the whorls. The lines of growth are rather prominent. It was found near Goodland Point, West Florida, by Hemphill.

Ethalia solida n. s.

Plate XXVIII. Figs. 3, 5.

Shell small, solid, stout, ivory white, of three rounded whorls, the last much the largest. Sculpture of fine incremental lines, sometimes faintly wrinkled near the suture; upper surface rounded, subconic, the whorls not impressed at the suture, which is fairly distinct. Periphery rounded, base subconic, umbilicus reduced to a minute chink with a twisted callus above it; aperture circular, oblique, with a triangular callus at each end of the columella; the upper margin declining. Alt. 2.0, max. diam. 2.75 mm.

Habitat. Station 19, Lat. 23° 3′ N., Lon. 83° 10′ W., off Bahia Honda, Cuba, in 310 fms., bottom temperature 62°.0 F.

This is more solid and elevated than any species yet described from this region.

Subgenus DILLWYNELLA Dall.

Shell resembling *Diloma* in form, but minute, depressed, porcellanous, with a thin horny operculum of comparatively few whorls; imperforate, but with a depression bounded by a riblet in the umbilical rib outside of the columella; whorls few with a thin fugacious epidermis; outer lip thin; pillar without teeth, projections, or folds, passing smoothly into the anterior margin.

Dillwynella modesta n. s.

Plate XXI. Figs. 3, 3 a.

Shell of three or four whorls, smooth, whitish, covered with an extremely thin epidermis which rises in microscopic blisters; spire rounded, depressed, with a distinct suture; sculpture of faint lines of growth except on the base where a single rounded riblet or carina bounds a somewhat concave lunate space outside of the polished columella; outer lip thin, sharp, a moderate callus on the body; pillar thick, polished; operculum translucent yellowish, of about five turns; aperture rounded, with a slight angle behind. Diam. of shell, 4.0; of aperture, 2.0; height of shell, 3.0 mm.

Habitat. Station 215, off St. Lucia, in 226 fms., coarse sand, bottom temperature 51°.0.

This little shell will not fit into any of the groups defined in the text-books, resembling more than any other group the *Rotellidæ*, from which it differs in wanting the sutural fasciole, the nacreous layer, and the basal callus, as well as in possessing an epidermis. It is remarkably solid for its size, and of a peculiar opaque whiteness, like *Mamma* among the *Naticidæ*. It is named in honor of the respected Dr. Dillwyn, whose "Catalogue" is one of the most careful and judicious works of the kind among the many which were published between the tenth edition of the "Systema Naturæ" and the epoch-making "Histoire des Animaux sans Vertèbres" of Lamarck.

Genus CALLIOSTOMA Swainson.

Calliostoma Swainson, Malacology, pp. 218, 351, 1840.
Ziziphinus Gray, Synops. Brit. Mus., 1840. (No description.)

There is no doubt that Swainson's name was defined in a proper manner, and published, before the name published by Gray and ascribed to an old manuscript of Leach. As the duplication of such a word as *Ziziphinus* has a particularly obnoxious sound, and the practice is condemned by all nomenclators and all rules, there would seem to be no reason except the natural perversity of human nature why any one who knows the facts should adhere to Gray's name in preference to the other. The type is *Trochus conulus* L. The nucleus appears to be either dextral or sinistral indifferently.

Section CALLIOSTOMA s. s.

Not umbilicated.

Calliostoma euglyptum A. Adams.

Zizyphinus euglyptus A. Adams, P. Z. S. 1854, p. 38. Reeve, Mon. Zizyph., pl. iii. fig. 17, 1863.

Habitat. Off the eastern coast of America, in 15–50 fms., from North Carolina to Florida, Texas, and Vera Cruz, Mexico. Fossil in Florida Pliocene.

This fine species varies in color from dark rose to yellowish white, sometimes unicolor, sometimes variegated with whitish clouds radiating from the invariably purplish apex. It was referred by Reeve to Tasmania, in error. It is the commoner imperforate species of Florida, often collected by tourists, and is found in the Caloosahatchie marls. I have seen no specimens from the Antilles, nor have I seen it quoted by any author from the West Indies. It may probably exist in Cuba.

Calliostoma Bairdii VERRILL & SMITH.

Calliostoma Bairdii Verrill & Smith, Am. Journ. Sci., Nov., 1880, p. 396. Dall, Bull. M. C. Z., IX. p. 45.
C. Psyche Dall (not described), Bull. M. C. Z., V. p. 61, July, 1878.
C. Bairdii Verrill, Trans. Conn. Acad., V. p. 530, pl. lvii. fig. 26, 1882.

Habitat. Florida, in 100–200 fms. Deep water off Newport, R. I., and in 50–200 fms., off shore, along the eastern coast of the United States.

The southern and West Indian form of the species is paler and more delicate in its colors, less elevated in form, and has the slopes from apex to the basal margins slightly concave. In the northern variety they are not concave, the shell is every way darker and duller in color, ruder, coarser, and less attractive. For the southern variety, the prior but undescribed name used by me in the first published reference to the species may perhaps be utilized with advantage.

Calliostoma circumcinctum DALL.

Plate XXII. Figs. 3, 3 a.

Calliostoma circumcinctum Dall, Bull. M. C. Z., IX. p. 44, 1881.

Habitat. Yucatan Strait, in 640 fms.; Station 2, in 805 fms.

This species appears to have a dextral nucleus.

Calliostoma echinatum DALL.

Plate XXI. Figs. 2 a, 5.

Calliostoma echinatum Dall, Bull. M. C. Z., IX. p. 47, 1881.

Habitat. Sigsbee, off Havana, in 80 fms.

Only one specimen has been obtained. The nucleus is sinistral and immersed.

Calliostoma sapidum DALL.

Plate XXI. Figs. 2, 4.

Calliostoma sapidum Dall, Bull. M. C. Z., IX. p. 46, 1881.

Habitat. Station 2, in 805 fms.

Only one specimen has been obtained which has a sinistral nucleus.

Calliostoma tiara Watson.

Calliostoma tiara Watson, Dall, Bull. M. C. Z., IX. p. 45, 1881.
Trochus (*Zizyphinus*) *tiara* Watson, Lin. Soc. Journ., XIV. p. 696, Sept., 1879; Chall. Gastr., p. 60, pl. vi. fig. 4, 1885.

Habitat. Station 44, 539 fms. Station 2, 220 fms. St. Thomas and Bermuda, Watson, Challenger Expedition.

Some specimens, especially those from off Havaña, in 450 fms., which I referred to this species in my Preliminary Report, I am now convinced are distinct, and they are so described here under the name of *C. corbis*. The nucleus of *C. tiara* is globular, and immersed to a greater or less extent. It looks as if it was originally sinistral.

Calliostoma corbis n. s.

Plate XXXIII. Fig. 1.

Shell small, white, with a glassy minute apparently dextral nucleus and about six whorls. The first one or two have concave arched transverse ribs, and resemble a bit of a small *Scala;* the others are very strongly reticulately sculptured. The spiral sculpture consists of one very strong rib on the periphery, a slightly weaker one near the suture, and another (which is rarely absent) midway between them; on the base there are four strong spirals a little undercut at their outer edges. Transverse sculpture of strong thin oblique radii (27–30 on the last whorl) following the lines of growth, reticulating the spirals (on crossing which they become slightly nodose) and forming deep squarish pits, which are elongated in the adult by the crowding of the radii toward the mouth. The suture appears channelled, as the whorl falls short of the peripheral rib which overhangs it, but is not really so. The base is flexuously radiately ridged but not reticulate; the aperture rounded, thickened within, lirate; the pillar thick with an obtuse knob almost a tooth about the middle of it. Umbilicus none; whorls flattened above between periphery and suture; base rather rounded. Alt. 5.0, max. diam. 3.75 mm.

Habitat. Off Havana, in 450 fms., Sigsbee. Station 20, in 220 fms. (with *C. tiara* Watson).

This species was at first confused with *C. tiara* Watson, which has not the continuous strong network, and in which the nodules which represent the intersections are of an imbricated character. The strong carina in *C. corbis* forms the periphery, in *C. tiara* the homologous spiral is comparatively faint and a little above the periphery. In *C. tiara* also the centre of the base is indented, almost umbilicated, which is not the case in *C. corbis*. The latter is a more solid shell, and the curious callosity on the pillar does not occur in any of the specimens of *C. tiara* I have seen.

Calliostoma roseolum Dall.

Plate XXIV. Figs. 6, 6 a.

Calliostoma roseolum Dall, Bull. M. C. Z., IX. p. 45, 1881.

Habitat. Station 11, Lat. 23° 43′ N., Lon. 83° 25′ W., near Havana, in 37 fms. Straits of Florida, in 200 fms. Also through the U. S. Fish Commission, in warm water (75°.0), from North Carolina to Yucatan, in 15–50 fms.

This very pretty species marches with *Trochus pulcher* C. B. Adams (Contr. Conch., 1850, p. 69), not of A. Adams (1851), in distribution and general coloration. It differs from it in having rounded, not carinated whorls, in the full, not flattened base, in the absence of the two strong articulated spirals on the periphery, and in having the whorls excavated above instead of nearly flat. *C. roseolum* has no peripheral articulations of dark red and white or yellow, which are the most prominent feature in good specimens of *C. pulcher*, the latter in this respect recalling *C. tampaënsis* Conrad. *C. roseolum* differs from *C. apicinum* in the absence of the liræ in the throat and the tooth-like process on the columella when adult. When young it has not the narrow chink behind the columella which is present in *C. apicinum*. The latter as far as observed is always pallid in color except at the apex.

The nucleus in all these species, as well as in numerous other deep-water trochids, is reversed and more or less immersed, a feature which I believe has never been remarked upon by any recent naturalist. This is, however, not true of all species from deep water, and when not mentioned in this Report it will be understood that the nucleus in the specimens examined was either dextral, or so imperfect that its character could not be ascertained.

Calliostoma apicinum Dall.

Plate XXIV. Figs. 3, 3 a.

Calliostoma apicinum Dall, Bull. M. C. Z., IX. p. 46, 1881.

Habitat. Barbados, 73–100 fms., coral, bottom temperature 73°.5 F. Off Havana, Sigsbee, 175 fms.

The examination of another specimen shows that this species covers the chink behind the pillar when adult, that there is a blunt knob suggesting *Thalotia* on the pillar, and that it has eight or nine strong liræ running into the throat and not connected with the outside sculpture, the one nearest the pillar thickened and raised at its termination. The nucleus is sinistral.

Calliostoma aurora Dall.

Plate XXXVII. Fig. 2.

Calliostoma aurora Dall, Agassiz, Three Cruises of the Blake, II. p. 68, fig. 285, Jan., 1888.

Shell delicate, nine-whorled, acutely pointed ; above with a color varying from light pink to straw-color; below light cream-color, the sharp peripheral carina lighter than the rest of the upper surface; general outline from nucleus to basal periphery somewhat concave; base concavely excavated within the margin, slightly convex toward the centre; nucleus whitish, smooth; whorls gently rounded, closely appressed to the almost invisible suture and excavated in front of it; the last whorl flatter above, more rapidly enlarging at the periphery. Sculpture of small regular waves on the carina, about six in a space of 5.0 mm., giving a minutely scalloped outline; behind this a strong nodulous thread, revolving like a string of small uniform beads; then a more slender thread more finely beaded; in all eleven regularly alternating revolving threads at the beginning of the last whorl; this sculpture is very uniform all over the upper surface; base polished, smooth, except for two or three faint beaded lines and grooves about the pillar, and faint longitudinal and transverse growth markings; aperture nearly twice as wide as high; lower lip with a beautifully concavely arched outline, falling much behind the upper one; margin simple, except for sculpture marks; pillar short, arcuated, pearly, simple, ending in a slight point. Height of shell, 21.0; extreme width, 26.5; height of aperture, 6.0 mm.

Habitat. Stations 265 and 299, near Barbados, in 576 and 140 fms., coral bottom, temperature 40° to 56°.5 F.

A single specimen and a fragment of this extremely lovely shell were obtained as above. It is well distinguished from its congeners, none of which closely resemble it. The color is evenly distributed in the type, but, as in *C. Bairdii*, it is likely that the color may be more dark and pronounced in more northern localities. The marked features are the concavity of the slope of the spire and of the outer portion of the base, the polished base contrasting with the regularly beaded upper surface, and the delicately notched carina at the periphery. It is one of the most attractive species of the genus.

Calliostoma orion n. s.

Plate XXVIII Fig. 2.

Shell small, white, acutely conical, with a glassy sinistral globular nucleus and five (or more) whorls; radiating sculpture consisting of faint incremental lines; spiral sculpture on the upper surface of the last whorl of seven nodulous revolving lines, beginning at the suture; the first, third, and fifth have larger nodules elongated in the direction of the lines, the second and fourth are more finely and simply evenly beaded. A single fine raised not nodulous thread separates each pair of the preceding; the sixth and seventh spirals are smaller than the fifth and close together; they stretch over a series of more distant swellings, and are concavely impressed between them; as these lines form the periphery, this gives a wavy or scalloped outline to the base, which has about eighteen such waves arranged to a certain extent in pairs, the distance and concavity between them alternating greater and less. The longer waves are articulated with pale brown, and the first and third spirals show traces of a similar articulation. The base is pretty sharply carinated, flattened, and finely spirally threaded, some of the threads showing faint traces of articulation; columella nearly straight, aperture nearly rectangular. There is no umbilicus or pit. Alt. 4.5, max. diam. 4.0 mm.

Habitat. Off Havana, in 80 fms., Sigsbee.

This little shell is not quite adult, and is evidently somewhat faded. Nevertheless, there is not any other species of the region possessing such a sculpture, and I have no doubt as to its novelty.

Section EUCASTA Dall.

Shell with a moderate sulcus near the periphery, producing a fasciole, as in *Pleurotomaria;* otherwise the shell characters as in *Calliostoma*, especially such species as *C. aurora*, etc. No umbilicus.

Type *C.* (*Eucasta*) *indiana* Dall.

Calliostoma (Eucasta) indiana n. s.

Plate XXXII. Figs. 3, 5.

Shell thin, conical, yellowish, with faint brown articulations on the spirals, with a minute sinistral nucleus, and six and a half whorls. Radiating sculpture of flexuous incremental lines, and fine wrinkles, which are more prominent toward the periphery on the last whorl and on the early whorls reticulate the spiral sculpture. On the last whorl these lines extend backward with moderate obliquity to the periphery, just above which is the fasciole caused by a well marked but shallow rounded sulcus; on the base they make a deep rounded concave sweep backward, and then ascend toward the base of the pillar. The spiral sculpture on the early whorls comprises two sharp narrow little elevated threads at the periphery, three, less contiguous, above the fasciole, and one near the suture, neatly reticulated by the wrinkles and minutely nodulous at the intersections. The spirals over most of the shell are strap-like, flattened, narrow, and distinctly marked off from the impressed broader interspaces; on the last whorl there is a single smooth flat thread below the nodulated one next the suture, and two run in the middle of the fasciole. The peripheral thread has become single and much stronger than the others. On the base there are seven spirals, faintly nodulous, articulated with pale brown, and separated by much wider impressed interspaces, over which are a few fine spiral lines. The base is flattened, or even a little concave; the pillar moderately arcuate, the mouth four-sided. There is no umbilical pit. Alt. 8.3, max. diam. 7.6, min. diam. 6.4 mm.

Habitat. Station 247, off Grenada, in 170 fms., gray ooze, bottom temperature 53°.5 F.

This pretty little shell has the aspect of a *Calliostoma*. I have had an opportunity of comparing it with *Förskalia declivis*, and should judge that this bears the same relation to *Calliostoma* that the other does to *Gibbula*. It certainly cannot be united with *Förskalia* or *Basilissa*.

April 29, 1889.

Section EUTROCHUS A. ADAMS.

Shell umbilicated. Type, *T. javanicus*, Lam.

A few years ago, in discussing the faunæ of the coasts of America, a naturalist would have called attention to the large number of fine species of *Calliostoma* found on the western coast, and the paucity of species on the east, as a peculiar characteristic.

Now, thanks to deep-sea researches, we know that there are probably as many, and certainly as fine, species of *Calliostoma* on the eastern shores of America as there are on the western, though unfortunately they are not quite so accessible.

The two oldest known forms from the West Indies labor under the peculiar difficulty, either of having close relatives in the East Indies and being confounded with them in the monographs, or of being erroneously assigned by authors to the East Indian fauna from time immemorial.

I find, for instance, *Trochus jujubinus* and *T. javanicus* assigned to the East Indies by the usual books of reference, except old Chemnitz, (though not by all writers,) and yet I have never been able to find an authentic specimen from a definite East Indian locality.

It is to be presumed that both these shells are West Indian solely, but it is rather curious that this matter has not been more generally understood, and settled. Unfortunately, I have not been able to consult Dr. Fischer's monograph, but that in Martini and Chemnitz refers only to Java. I prefer on the whole, considering the falsity of the first specific name, to use Reeve's name of *zonamestus* for *Trochus javanicus*, of which I have a fine specimen from St. Kitts.

I have the pleasure of adding some of the finest species known to the already rather long list of this group.

Calliostoma (Eutrochus) jujubinum GMELIN.

Trochus jujubinus Gmelin, Syst. Nat., p. 3570. Dillw. Cat., II. p. 762.

Habitat. Station 2, in 805 fms., dead, and probably drifted. Coast of North Carolina, in the warm water off shore, to Florida, Texas, and Yucatan, in 10–30 fms. Antilles, Cuba, Jamaica, St. Thomas, Carthagena, Virgin Islands, Bahamas, St. Croix, U. S. Nat. Mus. Pliocene of the Caloosahatchie deposits, southwest Florida, Dall.

Var. *tampaënsis* Conrad. Whorls flat above instead of excavated; colors clouded dark and light brown and white, instead of reddish; distal end of pillar more prominent. (Florida and northward.)

Var. *Rawsoni* Dall. Shell smaller, whorls excavated above, umbilicus smaller, pillar thin, and tooth weak or absent; color dark red or very dark brown and red, with lunate white cloudings; cone of shell more acute, nucleus white, minute, globular. (St. Croix, Gov. Rawson. Gulf of Mexico, U. S. Fish Commission.)

The fossils are not quite equal to the average of recent specimens in size, contrary to the usual rule, but otherwise are identical. The varieties blend in a large series.

Calliostoma (Eutrochus) yucatecanum Dall.

Plate XXIV. Figs. 4, 4 a.

Calliostoma yucatecanum Dall, Bull. M. C. Z., IX. p. 47, 1881.

Habitat. Yucatan Strait, in 640 fms. U. S. Fish Commission Stations 2605, 2608, 2615, and 2619, off the coast of North Carolina, in the warm area, in 15–32 fms., sand; bottom temperature 78° to 80°.0 F.

Most of the northern specimens are less elevated and proportionally wider than the Blake specimen which has been figured, but which seems to have been a little unusual in its elevation.

Calliostoma (Eutrochus) Sayanum n. s.

Plate XXXIII. Figs. 10, 11.

Shell large, polished, solid, eight-whorled, having a good deal the form of the *C. tigris* of New Zealand ; umbilicated ; straw-yellow lineated with red-brown, and having a broad rose-colored peripheral band. Walls of umbilicus marked with incremental lines, slightly excavated near the carina, above convex, the convexity revolving with the whorl; convexity straw-color, a deep brown band revolving just within the carina. Spiral sculpture outside the carina, which is not very sharp, consisting of two strong beaded spirals alternating with two fine simple brown elevated lines, then nine subequal, finer, less coarsely beaded, the upper angle of the aperture being at the ninth; all these straw-color with brown interspaces; then three fine yellow-brown undulated lines, then a larger nodulated peripheral spiral with a smaller similar one on each side of it, these and their interspaces of a deep rose-pink; above the pink band is the largest nodulated spiral, followed by (on the last whorl) seven or eight somewhat smaller, alternating larger and smaller, the last separated by a smooth space from the suture. These are all straw-color with brown interspaces and an occasional intercalary fine line. Radiating sculpture only of faint incremental lines. Nucleus lost; the earlier whorls have three nodulated spirals. Base and whorls a little convex, periphery evenly rounded, sutures distinct. Aperture ovate, margin simple, columella concavely arched, a slight angle, not to be called a tooth, formed by the end of the umbilical carina at the base. Interior extremely nacreous. Max. lat. of base, 40.0; of mouth, 18.0; max. alt. of shell, 37.0; of mouth, 10.0 mm. Apical angle about 80°. Operculum amber-colored, fibrous toward the edges, with twelve or more whorls, a small central elevation on the inner side.

Animal with stout rounded muzzle, short stout tentacles, large black eyes, a very large anterior epipodial lobe, two lateral cirri, and two or three small ones from under the operculum. The foot is bluntly rounded before and behind. The color of the external soft parts is uniform straw-color.

Habitat. U. S. Fish Commission Station 2594, of 1885, twenty miles southeast from Cape Hatteras, N. C., in 120 fms., sand, bottom temperature 58°.0. A fragment at Station 2601, thirty-six miles south half west from Hatteras, in 107 fms., sand. Both collected by the U. S. Fish Commission Steamer Albatross.

This is altogether the finest American species, and cannot be confounded with any other now known.

Calliostoma (Eutrochus) Benedicti n. s.

Plate XXXII. Fig. 7.

Shell depressed, with an acute apex and slightly concave outline, umbilicated, polished; straw-colored, lineated with red brown and pale pink; base convex, slightly flattened, periphery rounded; nucleus minute, apparently dextral; whorls seven or more; umbilicus deep and narrow, with flexuous walls excavated near the carina, which is marginated with an opaque white band; spiral sculpture beginning at the umbilicus ; outside the carina, which is simple, two strong broad subnodulous spirals separated by a deep line, then fourteen or more equal smooth flattish spirals with narrower interspaces and obsolete spiral striulæ here and there; then a smooth or slightly striate peripheral space ; all the preceding straw-color. Above the periphery two pink and one straw-colored large smooth and rounded spirals, one smaller smooth one, then three large and two intercalary smaller nodulous spirals separated from the suture by a narrow smooth space. The interspaces are brown, the elevations straw-color. The early whorls have two or three smooth and one or two nodulous spirals, the former remain constant with growth, the latter increase in number. Radiating sculpture of flexuous incremental lines, hardly visible. Aperture rounded squarish, columella white, thin, concave, a small notch at its base. Alt. of base, 7.5; of spire, 6.5; total, 14 mm. Max. lat. of base, 18.0; of mouth, 8.5. Apical angle about 90°.

Operculum yellow, multispiral, translucent, polished. Type specimen not full grown.

Habitat. Off Cape Lookout, N. Carolina, in about 200 fms., U. S. Fish Commission.

This is a very handsome species, recalling the var. *Psyche* of *Calliostoma Bairdii*, from which it is easily distinguished by its umbilicus and sculpture.

It is named in honor of Mr. J. S. Benedict, formerly naturalist of the Albatross party, who rescued it from a pilfering and æsthetic sailor, by whose theft the exact station number was lost. It was living when obtained. The soft parts as preserved are whitish, with very large black eyes. The foot is long, narrow, and pointed behind. The epipodium has a very large anterior lobe reaching to the base of the tentacles, and four long cirri diminishing backward, set at regular intervals, two being under the shadow of the operculum; the posterior part has no cirri. The muzzle is long, widened and papillose at its extremity which seems as if it might expand into a sort of tube in front of the jaws, which are black. There are no epipodial lobes between the tentacles. The animal recalls that of *Eutrochus cinctellus*, but is larger.

Calliostoma (Eutrochus) cinctellum n. s.

Plate XXXII. Figs. 1, 4.

Shell small, thin, pearly white with faint touches of pale brown, seven-whorled, with a globular inverted minute nucleus and rather convex base; spiral sculpture of two prominent spirals, one peripheral, simple, sharp, with occasional touches of brown; against this the suture is laid in the earlier whorls, while in the last whorl it descends below it; the other spiral is above the periphery, and is stronger and ornamented with (on the last whorl) about forty sharp projecting thorn-like tubercles, each inclined a little forward, and alternating brown and white. Between this and the periphery the space is excavated. Above these there are about four (on the earlier whorls one or two) small raised spiral lines separated by much wider interspaces, nodulated with small but prominent nodules at the intersections with the radiating sculpture; all the sculpture growing fainter, and intercalary fine lines appearing, toward the aperture on the last whorl. Base with two strong nodulous spirals separated by a deep interspace, the inner one forming the umbilical margin; outside of these 16–20 fine flattened spiral threads, with about equal interspaces, reaching to the periphery and hardly ruffled by the incremental lines. Radiating sculpture much like that of *C. tiara*, of numerous, on the early whorls strong, slightly elevated oblique threads, extending clear across the whorls and reticulating the spirals; these radii grow fainter and finally on the last whorl nearly disappear; on the base there are only faint flexuous incremental lines. Umbilicus narrow, its walls flexuous, yellow. Aperture squarish, the pillar little concave, not toothed, margin thin and simple. Upper surface of whorls except the sculpture flattened; suture distinct, not channelled. Operculum horny, multispiral. Alt. of shell, 9.5; of spire above the aperture, 6.5; max. diam. of base, 8.0; min. diam., 7.0 mm.

Soft parts whitish, foot short, pointed behind, muzzle rounded, gill single, anus prolonged into a long free papilla, eyes large; tentacles long and stout, without frontal lobes; epipodium with a large anterior lobe, and four cirri all anterior to the operculum and about of equal size. Jaws separate, squarish, composed of small horny obliquely set rods, whose lozenge-shaped end-sections reticulate the surface under the microscope.

The dentition is peculiar. The rhachidian and (on each side) five laterals have broad simple bases with a pear-shaped outline; the cusps, which might be compared to the stem of the pear bent over, are extremely narrow and long and symmetrically serrate on each side with 4–6 serrations. The major uncinus is stout and has a large four-toothed ovate cusp; there are about twenty more slender uncini with scythe-like cusps serrate on the outer edge; outside of these are two or three of a flat form, like a section of a palm-leaf fan from handle to margin with four riblets, and the distal edge with three or more indentations. Under pressure these uncini have a tendency to split up lengthwise, beginning at the indentations. They are flat and smooth, thinner toward the distal end, and have no distinct shaft.

Habitat. Off Havana, at Station 101, in 174 fms., Sigsbee.

This interesting species looks at the first glance as if the excavated space between the peripheral cinguli was fasciolar, like that of *Eucasta*, but a more careful inspection shows that there is no sign of a notch or sulcus in the lines of growth. The dentition forms a combination so far not recorded among the Trochidæ, but which will perhaps seem less singular when more species have been examined. The radula is quite minute and difficult to examine; when only the cusps of the central and lateral teeth were in the field of the microscope, they were so slender and elongated as to suggest little tails, and the symmetrical notching gave them almost a jointed appearance. The shell is very pretty, and recalls *Basilissa* in its general appearance.

Calliostoma (Dentistyla) asperrimum Dall.

Margarita asperrima Dall, Bull. M. C. Z., IX. p. 40, 1881.

Habitat. Station 12, in 177 fms.; Barbados, in 100 fms.; Station 20, in 220 fms.; Station 206, off Martinique, in 170 fms., sand, bottom temperature 49°.0; Stations 273 and 299, off Barbados, in 103–140 fms., coral, bottom temperatures 56° to 59°.0 F. U. S. Fish Commission Station 2602, off North Carolina, in 124 fms., sand.

Variety *dentiferum* Dall, Plate XXIII. Figs. 7, 8.

Sculpture more strongly and exclusively nodulous; a strong blunt tooth on the columella just within the aperture and above the base. Outer lip lirate within. Alt. 7.5, lat. 6.0 mm. Habitat, Station 299.

Calliostoma (Dentistyla) sericifilum n. s.

Plate XXIV. Figs. 1, 1 a.

Shell delicately but sharply reticulate all over; two peripheral spirals minutely spinose at the intersections; columellar tooth present but not strong. Shell thinner and more nacreous than the typical form, and with the radiating and spiral sculpture not differing so much in strength. Alt. 4.5, lat. 4.1 mm.

Habitat. Station 262, off Grenada, in 92 fms., sand, bottom temperature 62°.0 F.

These species are somewhat puzzling. With the external sculpture and umbilicus of a rather conical *Solariella*, we find in adult specimens a well marked blunt tooth on the columella, and the aperture opposite furnished with raised liræ. In other specimens these are not visible, but then it is impossible to say that they are completely adult. The sculpture runs the usual gamut of evenly reticulate; nodose reticulate, the intersections marked by little imbrications while most of the network is obsolete; and, finally, of uneven reticulation where the cords one way are much stronger than those by which they are intersected. None of the specimens contained the soft parts, so their relations must for the present remain problematical. The group is hardly *Thalotia*, being umbilicate; it is certainly not a *Euchelus* or *Craspedotus*. Perhaps the most reasonable conclusion, in the absence of more information, is that this section bears to *Thalotia* about such a relation as *Eutrochus* bears to *Calliostoma*. The tooth is on the pillar, not at its anterior end.

Genus MARGARITA Leach.

Margarita Leach, Journ. de Phys., LXXXVIII. p. 464, 1819, Appendix to Ross's First Voyage, 1819.

Margarita Broderip & Sowerby, Zoöl. Journ., IV. p. 363, 1828.

Margarites Leach MS., 1819, Gray, Ann. Mag. Nat. Hist., XX. p. 268, 1847; Synop. Moll. Gr. Brit., p. 197, Dec., 1852. (Type, *M. helicina* Fabr.)

Eumargarita Fischer, Man. Conch., p. 825, 1885.

Not *Margarita* Leach, Zoöl. Misc., I. p. 107, 1814, = *Margaritifera* Da Costa (1776) et al.; *Unionum* Link (1807); *Margaritiphora* Megerle (1811); *Meleagrina* Lamarck (1812); etc.

In 1814 Leach used the name *Margarita* for a section of *Avicula*, which had already received several names. The name *Margarita* was therefore a synonym. In 1819 he used the same name, this time for a valid genus; but, apparently recognizing that this might cause confusion, he changed its termination in a work which he had in press in 1820, and which was interrupted by his death. This work was published some thirty years later by Dr. J. E. Gray.

The second use of a generic name once fallen into synonymy, although not forbidden by the accepted rules for nomenclature, is greatly to be deprecated; yet when it has occurred, and when the second application of the name is universally unchallenged for more than half a century, and the original application never was in use and has been absolutely ignored, I can see no benefit likely to accrue to science from a change of names. It cannot be too clearly understood that an *ex post facto* application of rules, however useful in themselves and for present guidance, to the work of authors preceding Lamarck's Animaux sans Vertèbres, will produce nothing less than confusion and annoyance. We have a right to insist on a consistently binomial nomenclature and strict priority for all names, but to attempt more is to invite chaos to come again.

It may be worth while to remark, as Leach's * book is a very rare one, that Vol. I. pages 1–57, plates i.–xxv. inclusive, were published in 1814; pages 57–129, plates xxvi.–lvii., probably in 1814; and the remainder certainly in 1815, as I have ascertained from contemporary advertisements issued with the parts. The genus *Bulimulus*, types *B. acutus* (Müll.), p. 41, and *B. trifasciatus* Leach, p. 42, would therefore date from 1814, also *Margarita* (type the mother of pearl shell of commerce), p. 107, and *Dipsas* (*plicatus* Leach), p. 119. *Aciona* Leach (type *Scalaria preliosa* Lam.), Vol. II. p. 79, dates from 1815.

Section MARGARITA s. s.

Margarita erythrocoma n. s.

Plate XXVIII. Fig. 1.

Shell small, depressed conic, yellowish, variegated and articulated with rose-pink and opaque white; whorls rounded, four or five in number, with a minute smooth nucleus; generally a little carinated on the upper surface, especially the earlier whorls, by one or two prominent spiral riblets; below full and rounded, with a small but well marked umbilicus. Radiating sculpture of the lines of growth occasionally irregular so as to form faint waves, but usually inconspicuous; spiral sculpture of fine close little-raised threads, with on the upper surface one and on the periphery another stronger thread or carination, seldom nodulous, and stronger on the earlier whorls. The spirals are usually articulated with rose-red and opaque white or greenish yellow. The base is rounded, finely spirally threaded, umbilicus not carinated nor marked by special sculpture. Aperture rounded, oblique, the margins a little angulated above, thin, simple, joined by a thin layer of callus on the body. Alt. of largest specimen, 5.0; max. diam., 5.25; min. diam. of base, 4.0 mm.

Variety ? *samanæ*. Shell more depressed, last whorl proportionately larger, and aperture much more oblique; umbilicus twisted, nearly closed, white with radiating flexuous striæ; shell colored like the typical form and with similar early whorls. Alt., 4.75; max. diam. of base, 5.75; min. diam., 4.25 mm.

Habitat. Off Sand Key, in 54 fms. Samana Bay, St. Domingo, and Nassau, Bahamas, U. S. Nat. Mus.

The variety. Samana Bay, in 16 fms., Couthouy.

This very pretty little species occurs with *Liotia miniata* in moderate depths of water. The specimen from 54 fms. was probably drifted. It may be distinguished from the *Liotia*, which is about the same size, by the different characters of aperture and umbilicus. There is no northern species which resembles it.

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* The Zoological Miscellany | being | descriptions of new or interesting animals | by William Elford Leach, M.D. F.L.S. & W.S. | [etc.] | illustrated with | colored figures drawn from nature | by R. P. Nodder [etc.]. London, Printed for E. Nodder & Son, 1814. | Second title, issued with the concluding part, has a quotation and "Vol. I.," added before "London," with date 1815. Total, Vol. I., 144 pp., 8vo, 60 colored plates; Vol. II., 161 pp., plates 61–120, "1815."

Subgenus TURCICULA Dall.

Turcicula imperialis Dall.

Plate XXII. Figs. 1, 1 a.

Margarita (*Turcicula*) *imperialis* Dall, Bull. M. C. Z., IX. p. 42, 1881.

Habitat. Off Cuba, in 200 fms.

Only the original specimen has been found so far in the Blake collection, but another has been added by the dredgings of the Albatross, from 182 fms., coral bottom, off Havana. It is also dead and wants the tip, but it shows from its proportions (base 12.0, and alt. of three whorls counting back from aperture 15.0 mm.) that the shell is more highly elevated and conical than would be anticipated from the specimen figured.

A fine species of what seems to be this subgenus of the group was obtained in the Pacific by the Albatross Expedition, and affords the following notes on the soft parts of *Turcicula*.

The sides of the foot below the epipodial line are granulous, above the line the surface is rather smooth. Much of the surface is apt to be covered with a layer of blackish or olivaceous substance like solidified mucus or paint, which seems to belong to the animal, yet is wholly external to the cuticle. The foot is broad, not very long, bluntly pointed behind; the front edge straight, double, the lateral angles pointed. The upper layer of the edge is smooth and turgid in most of the specimens. It is not indented in the median line.

The muzzle is stout, circularly wrinkled, a little expanded at the disk. The oral disk is not marginated; its surface is finely granulose; it is angulated at its lower outer corners and medially indented below. There are no oral palps or tactile appendages.

The cephalic tentacles for the size of the animal are small and short. At their inner bases are small "palmettes," or cephalic epipodial fringes, not quite meeting in the middle line. They are rounded, with papillose edges. At the outer bases of the tentacles are the eyes, large, oliviform, mounted on short pedicels. The pigmented portion itself is ovoid, and not hemispherical. In some specimens the pigment seems to be more extensive on the under side, in others the reverse, and still others have it equally distributed. A lens and aqueous humor are distinctly observable. At the right side, behind and on a level with the eye, is a short tubular verge. The anterior epipodial side-lappet does not appear to be modified into a seminal conduit, as in *Margarita infundibulum* Watson. These lappets are nearly symmetrical. Their bases are turned up a little on each side behind the eyes, and the lappets are rather wide. They extend backward about two thirds of the way to the operculum, with a finely papillose edge. Then comes a single tentacular filament, less than half as long as a cephalic tentacle. There is another stretch of edge fringed with only small papillæ; under the operculum there are three long filaments, of which the posterior is longest. Behind the operculum the epipodial lines of the two sides approach each other and bound a median furrow, coarsely transversely ridged (as in *Pleurotomaria*), which extends to the end of the foot.

The mantle-edge is smooth or very sparsely papillate, slightly thickened. The free end of the intestine projects on the right side over the neck, with its termination constricted by a sphincter, and then expanded into a cup-shaped circular foramen. On the left side is the gill, consisting of a central somewhat muscular ensiform basement, from which depend two sets of elongate-triangular lamellæ separated by a narrow ridge. The left-hand set are slightly the longer. Most of the gill is free. Its distal end is pointed, and the lamellæ hang, side by side, with the ridge between the two series, as in *Nucula*. The intestine takes a curve to the left side, where the renal gland is visible between it and the gill. I observed no osphradium.

The mouth is small. A short distance behind it is a deep radular diverticulum. The jaws are small, triangular, and dark brown. The gullet opens almost directly into an elongate large longitudinally wrinkled stomach. Behind it the very large intestine, with longitudinally striated walls, extends backward about half a whorl; then turns upward and forward for a third of a whorl; then back again upon itself about the same distance; then forward to its anal termination above described.

The liver and seminal gland appear to resemble those of ordinary Trochids.

The operculum is amber-colored, polished, thin, and centrally depressed. It has about a dozen whorls. The opercular pad is ovoid and rather small.

The radula is quite small and the anterior part dark brown. The intestine in all the specimens is crammed with a greenish mud consisting of disintegrated foraminifera.

The dentition recalls that of *Calliostoma*, *Solariella*, *Margarita*, etc., and presents nothing very characteristic.

The central tooth has a broad thin base, subrectangular, and a little wider at the anterior corners. The stem of the cusp and the cusp are narrow. The latter is simple, rather small, short and recurved. It is not denticulate. There are three or four admedian or lateral teeth, rather long, with small bases, rather broad simple moderately curved brownish cusps. There are about twenty-five uncini, half of which spring from lozenge-shaped bases looking like a pavement, are long, narrow, slender, moderately curved with spatuliform tips. One edge of these tips is microscopically serrate, and below the serrate part on the same side is a single larger denticle, standing out like a short thumb.

The external uncini are thin, flat, wide, and hardly curved. Their distal ends are flat and broad, with the edge simple and entire. These teeth gradually diminish in size and width, as usual in *Trochidæ*. The formula would be $25 + 3 + \frac{1}{1} + 3 + 25$, or very nearly that, but time has been wanting in which to undertake the laborious task of an exact enumeration of these minute and tangled objects, of which the general features have just been recorded.

All the specimens of *Turcicula* previously obtained were incomplete and deprived of epidermis. The Pacific species, which will be described in the Report on the Voyage of the Albatross, reaches a large size (50.0 mm. high by

42.0 wide), is covered with a delicate green epidermis, which erodes like that of a fresh-water shell, and exhibits a nearly circular aperture with a somewhat reflected lip and brilliantly pearly throat. There is no callus across the body nor any umbilicus. The shell bears a singular resemblance to a very large thin greenish *Vivipara* or *Tulotoma.* It is one of the finest animals collected on the Albatross voyage, and was found in about four hundred fathoms, off the coast of Southern California.

It will be named *Turcicula Bairdii* in honor of the late U. S. Fish Commissioner, Prof. Spencer F. Baird. A larger variety or closely related species was dredged at about the same depth off the coast of Peru.

Section BATHYMOPHILA Dall.

Margarita (Bathymophila) euspira Dall.

Plate XXXII. Fig. 8.

Margarita ? *euspira* Dall, Bull. M. C. Z., IX. p. 44, 1881.

M. (*Bathymophila*) *euspira* Dall, and var. *nitens* Jeffreys (MS.), Bull., *lib. cit.*, p. 102, Oct., 1881.

Habitat. Station 2, in 805 fms.

This species seems to be widely spread over the North Atlantic, and was taken in considerable numbers by the Porcupine and Valorous Expeditions.

It would seem as if the coronated form was less abundant than that not so ornamented, judging by the specimens in the Jeffreys collection. The young ones are often strongly spirally ridged, and it will be remarkable if they do not get described as a *Cyclostrema* on their own account.

The only species with which this is likely to be confused is *Umbonium Bairdii*, in which the whorls are much less rounded, being appressed to an even slope from the apex to the periphery, while in *M. euspira* the suture is very distinct, and even in the coronated variety the whorls round down to it. On the base *M. euspira* has no large callus, its callus being confined to the surface of the pillar, and not a pad filling the umbilical basin. *M. euspira* is larger and proportionally more elevated, and the young have a wide umbilicus. It is also more pearly than the other.

I doubt extremely whether this little shell is related to *Oxystele*, as some of my conchological friends would have it; but whether the sectional name proposed for it be worth retaining or not, I propose to suspend judgment until I can get hold of some specimens preserving the soft parts.

Subgenus SOLARIELLA A. Adams.

Solariella amabilis Jeffreys.

Trochus amabilis Jeffreys, Brit. Conch., III. p. 300; V. pl. lxi. fig. 6.

Habitat. Station 46, in 888 fms.; Yucatan Strait, in 640 fms.; Station 41, in 860 fms.; Station 2, in 805 fms.; Station 21, in 287 fms., living; Station

211, in 357 fms., near Martinique; Station 221, off Santa Lucia, in 423 fms., ooze, bottom temperature 43°.0. Also, living, at U. S. Fish Commission Station 2644, in 193 fms., sand, off Cape Florida, bottom temperature 43°.4 F.

Solariella lamellosa Verrill & Smith.

Margarita lamellosa Verrill & Smith (1880), Trans. Conn. Acad., V. p. 530, pl. lvii. fig. 38, 1882.

Habitat. Barbados, in 100 fms. U. S. Fish Commission Stations 2595, 2601, 2602, and 2614, off the coast of North Carolina, in 15–32 fms., gravel.

Constantly smaller and differently wrinkled from the preceding.

Solariella scabriuscula Dall.

Plate XXI. Figs. 10, 10 a.

Margarita scabriuscula Dall, Bull. M. C. Z., IX. p. 41, 1881.

Habitat. Station 44, Gulf of Mexico, southern part in 539 fms., bottom temperature 39°.5 F.

Only a single specimen of this species has so far reached me.

Solariella ægleis Watson.

Margarita ægleis (Watson), Dall, Bull. M. C. Z, IX. p. 40, 1881.
Margarita ægleës Watson, Journ. Linn. Soc., XIV. p. 704, Sept., 1879; Chall. Rep. Gastr., p. 81, pl. v. fig. 10, 1885.

Habitat of typical form. Station 19, in 310 fms. Off Cape St. Antonio, in 640 fms. Station 230, off St. Vincent, in 464 fms.

Having given a good deal of study to the group which clusters around the above specific name, I have modified the views expressed in my preliminary paper. I had not then had the opportunity of studying the large series of specimens, recent and fossil, contained in the Jeffreys collection.

Not only am I obliged to review my own opinion, but I find myself wholly unable to accept the views of Dr. Jeffreys, expressed in his "Lightning and Porcupine Mollusca," Part VI. pp. 97, 98 (P. Z. S. 1883).

Primarily I find two fossil species, which appear to be the forerunners of the group, and one of which appears to be found in a recent state. They are *Trochus cinctus* Philippi, and *Solariella maculata* Searles Wood. The first has somewhat the form of *Solariella amabilis* Jeffreys, but was a brightly colored shell, and to my mind appears perfectly distinct from any of the recent forms and from Wood's species.

Wood's species is (according to specimens identified by Professors Dewalque and Seguenza) identical with *Turbo moniliferus* Nyst, non Sowerby, which is the *Solarium turbinoides* of Nyst subsequently. Wood's name has precedence.

I find, however, that a species described by Libassi has been confounded with *S. maculata* in a way I am not able to untangle, *S. peregrina* Libassi being named *Trochus* and *Solarium* by various contributors to the Jeffreys collection, and Libassi's paper being inaccessible to me. Two species have been sent under that name, one being *S. maculata* Wood, and the other the broad variety of *S. ægleis*, both being found in the Tertiaries of Belgium and Italy. To which Libassi's name applies I am not able to say. If to *S. ægleis*, it would of course take precedence.

Leaving this question to be settled by any one having access to Libassi's work, we may now proceed to eliminate other extraneous matters from the synonymy of *S. ægleis*. *Solariella lamellosa* Verrill & Smith, and *S. amabilis* Jeffreys, after careful study of a large series, I now consider distinct from each other, from *S. ægleis*, and from *S. cinctus*, with which Dr. Jeffreys united his *amabilis*. Both *amabilis* and *ægleis* seem to have *occasional* finely reticulated specimens with the strong spirals absent. These have been lumped together as var. *affinis* Jeffreys. I am pretty confident that a larger series of specimens would connnect together *Trochus rhina*, *rhysus*, *clavatus*, and *ægleis* of Watson too closely to be specifically separated, but I have only been able to compare specimens of what I suppose to be *S. clavata*, *rhina*, and *ægleis*, broad and narrow varieties. But these have nothing to do with *Trochus Ottoi* Philippi (*Margarita regalis* Verrill & Smith), which has been injudiciously referred to them by Dr. Jeffreys, I presume by a lapsus of memory. For the purposes of this paper I shall keep these supposed varieties separate.

Solariella ægleis var. *lata* Dall (? = *peregrina* Libassi).

Habitat. Station 208, off Martinique, 213 fms.; off Havana, Cuba, in 400 fms.; Station 2, in 805 fms. Tertiary of Belgium and of Reggio, Italy. Talisman Expedition, as "*Trochus Ottoi*" in Jeffreys collection.

Solariella (*ægleis* var.?) *rhina* Watson.

Habitat. Station 2, in 805 fms.; Station 176, in 391 fms.

Solariella (*ægleis* var.?) *clavata* Watson.

Habitat. Station 2, in 805 fms., and Yucatan Strait, in 640 fms.

The width and height of the shell, the strength of the spirals and tuberculation, and the size of the umbilicus, are all more or less variable factors, not only in these deep-sea species, but in the ordinary littoral forms, as every collector is aware.

Solariella infundibulum WATSON.

Trochus (*Margarita*) *infundibulum* Watson, Journ. Linn. Soc., XIV. p. 707, Sept., 1879; Chall. Rep. Gastr., p. 84, pl. v. fig. 5, 1885.

Habitat. Station 41, in 860 fms., bottom temperature 39°.5. Station 163, off Guadelupe, in 769 fms., sand, bottom temperature 39°.75 F. U. S. Fish Commission Station 2723, 1886.

This fine species grows as large as *S. Ottoi* Phil., or larger, and in sculpture is about midway between that species and the more robust varieties of *S. ægleis* Watson. It belongs in the cold area.

This species has been imperfectly figured by Pelseneer in the Challenger Report on the Anatomy of Deep Sea Mollusks. Specimens have been compared for me with Watson's types by Mr. E. A. Smith at the British Museum, who identifies my specimens with Watson's species. The male of this species has a verge behind the right tentacle 2 mm. long, simple and tubular. The right anterior epipodial lappet is specially modified into a conduit for the seminal matter, and is rolled into a large long tube into the proximal end of which the penis discharges. It is probable that this conduit serves to conduct the semen to the eggs as they are deposited, rather than for copulation. There are no epipodial remnants between the tentacles. These organs will be more fully described in my Report on the Albatross Expedition.

Solariella Ottoi Philippi.

Trochus Ottoi Philippi, Moll. Siciliæ, II. p. 227, pl. xxviii. fig. 9, 1884. Jeffreys, P. Z. S., 1883, p. 98.

Margarita regalis Verrill & Smith (1880), Trans. Conn. Acad., V. p. 530, pl. lvii. fig. 37, 1882; VI. p. 254, pl. xxix. fig. 14.

Habitat. Station 264, off Grenada, in 416 fms., ooze, bottom temperature 42°.0 F. U. S. Fish Commission, at various stations off the northeast coast of the United States, in 115–500 fms. Pliocene of Italy, Philippi, Seguenza, etc.

The comparison with an authentic specimen of Philippi's fossil leaves no doubt whatever that the species described by Prof. Verrill is identical with it as claimed by Dr. Jeffreys. The *T. Vaillanti* Fischer I have never seen, and the *T. ægleis* of Watson, which Dr. Jeffreys also unites with *Ottoi*, I regard as entirely distinct.

Solariella lissocona Dall.

Plate XXI. Figs. 8, 8 a.

Margarita lissocona Dall, Bull. M. C. Z., IX. p. 41, 1881.

Habitat. Station 47, N. lat. 28° 42′, W. lon. 88° 40′, in the north central part of the Gulf of Mexico, in 331 fms., bottom temperature 47°.0 F.

Only one specimen has turned up, so far, of this very well marked species, which belongs in the group of *S. ægleis*, *infundibulum*, etc.

Solariella lacunella Dall.

Plate XXI. Figs. 1, 1 a.

Margarita maculata Dall, Bull. M. C. Z., IX. p. 43, 1881. Not of Searles Wood, 1842.

Margarita lacunella Dall, *op. cit.*, p. 102.

Habitat. Station 2, in 805 fms.; Station 132, off Santa Cruz, in 115 fms., bottom temperature 65°.0 F. U. S. Fish Commission Stations 2592, 2602, 2606, and 2612, off the coast of North Carolina, in 25–124 fms., gravel, bottom temperature 58° to 77° F.

This species is nearest to *Trochus cinctus* of Philippi, but differs in so many details of sculpture, etc., that, though variable, I do not see my way clear to unite them at present. The coloration is variable; some are clouded with olive, and others with pinkish brown.

A variety, *depressa*, has the spire low and somewhat tabulated by a smooth space between the suture and the spiral ribs.

Solariella iris Dall.

Plate XXI. Figs. 7, 7 a.

Margarita iris Dall, Bull. M. C. Z., IX. p. 43, 1881.

Habitat. Sand Key, in 119 fms., living, Sigsbee.

Only one specimen of this form has been found. The upper surface much resembles that of *M.* (*S.*) *lacunella*, but the base, especially the umbilicus, is altogether different, the shell is thinner and much more pearly, and the spiral lines are much finer.

Solariella lubrica Dall.

Plate XXI. Figs. 9, 9 a.

Margarita lubrica Dall, Bull. M. C. Z., IX. p. 44, 1881.

Habitat. Station 2, in 805 fms.; Station 220, off Santa Lucia, in 116 fms., rocky bottom, temperature 58°.5 F.

Var. *iridea* Dall. Shell without the coronation at the suture, or only slight traces of it, umbilical carina less strong, umbilicus smaller, whorls inflated, very round, brilliantly pearly, base wider than in the type.

This extremely lovely little shell, when fresh, has a most brilliant greenish nacre, shining like a diamond beetle. The variety was dredged by the U. S. Fish Commission, off Cape Florida, in 193 fms., sand, bottom temperature 43°.4 F.

Genus EUCHELUS Philippi.

Euchelus guttarosea n. s.

Plate XXXIII. Fig. 7.

Shell small, white, the upper surface of the whorls with very small distinct rose-red dots sparsely distributed on the raised nodules of the sculpture, or all white; five or more inflated strongly sculptured whorls, and a smooth nucleus. Spiral sculpture of, on the upper surface of the last whorl, two small and two strong spiral alternated ribs, one of the smaller just below the suture; a large spiral on the periphery and four on the base; crossed by numerous obliquely radiating threads, which make the early whorls coarsely reticulate with nodules at the intersections, while in the later whorls the radiations become less marked and the spirals more numerous and more conspicuously nodulous. Whorls rounded, apex a little blunt, suture distinct, not channelled, base rounded, umbilicus none; pillar nearly straight, with a strong tooth near its base, aperture rounded, oblique, a little descending above, with six or eight stout liræ ending in tooth-like nodules, body with a moderate layer of nacreous callus. Alt. 5.0, max. diam. 4.5 mm.

Habitat. Off Havana, in 119–450 fms. Samana Bay, Santo Domingo. Nassau, Bahamas. Various collections from the "West Indies."

This little shell is proportionally more depressed, and has fewer spirals when young, and owing to the persistent liræ looks adult at almost any stage. It is extremely lovely when color and sculpture are perfect and fresh, but often is wholly whitish. I have found it labelled by the name of *punctiger* A. Adams, a much larger umbilicated species from the Indo-Pacific region.

I have not been able to find a description of it, or any figure closely resembling it.

Genus **BASILISSA** Watson.

Basilissa Watson, Journ. Linn. Soc., XIV. p. 593, April, 1879.

Shell trochiform, umbilicate, nacreous, sculptured. Pillar concave, its distal end projecting as a strong tooth. Margin of the aperture concavely sinuate near the suture and on the base. Peripheral margin produced, claw-like, between the two shallow sinuations. A grooved or denticulate callus in the adult on the body whorl and within the margin of the aperture. Aperture sub-rhomboidal. Operculum multispiral, horny, with a circular callus on the inner central face and a subcircular outline. Example, *B. costulata* Watson.

The above amended diagnosis is rendered necessary by the discovery of adult specimens among the Blake shells. It is probable that most of the species in an adult condition conform to it. It is conchologically related to the genus *Seguenzia*, a transition from which is indicated by such species as *S. carinata*, *S. elegans*, and *S. trispinosa*. But the soft parts as yet are unknown. Should it be found, however, that some species do not exhibit the denticulation, etc. described in *B. costulata*, and conform to the edentulous type indicated in Watson's original description, (and *B. alta* may prove to be of this character,) these would of course retain the original name of *Basilissa*, while for the dentate forms the name of *Ancistrobasis* might be used.

I have placed these species after the *Trochidæ* in accordance with the general custom, but I do not feel confident that the eventual position of all the species will be here.

Section BASILISSA s. s.

Basilissa alta WATSON.

Basilissa alta Watson, *loc. cit.*, p. 589; Dall, Bull. M. C. Z., IX. p. 48, 1881; Watson, Chall. Rep. Gastr., p. 100, pl. vii. fig. 8, 1886.

Habitat. Station 43, in 339 fms.; Station 41, in 860 fms.; Station 163, near Guadelupe, in 769 fms., fine sand, bottom temperature 39°.5 F.; and Station 264, near Grenada, in 416 fms., gray ooze, bottom temperature 42°.5 F.

All these specimens were dead, though one or two were tolerably fresh, while most of them were defective. The sculpture varies between the typical form and the variety *oxytoma* Watson (*loc. cit.*, pl. vii. fig. 8 a). The size of the specimens is very uniform.

Basilissa superba was dredged by the U. Fish Commission off the east coast of the United States, south of Hatteras; the exact locality of the specimens was, however, lost.

Basilissa alta WATSON var. delicatula DALL.

Plate XXII. Figs. 2, 2 a.

Seguenzia delicatula Dall, Bull. M. C. Z., IX. p. 48, 1881.

Habitat. Station 2, in 805 fms.

This is more delicate and thin than the type, but otherwise much like it, except that the delicate spiral threads cover the whole surface of the shell.

The reference of this form to *Seguenzia* was an error into which I was led by the imperfect state of my specimens and the absence of any others for comparison.

Section ANCISTROBASIS DALL.

Basilissa (Ancistrobasis) costulata WATSON.

Plate XXIII. Figs. 4, 4 a.

Basilissa costulata Watson, *loc. cit.*, p. 600; Dall, Bull. M. C. Z., IX. p. 48, 1881; Watson, Chall. Rep. Gastr., p. 103, pl. vii. fig. 11, 1886.

Habitat. Yucatan Strait, in 640 fms.; Station 50, 119 fms.; Sand Key, in 15 fms.

Basilissa costulata var. depressa DALL.

The shell figured differs from *B. costulata*, as described and figured by Watson, in the less flexuous radiating costæ, which are nearly equal to the interspaces in width, and in the smaller number of spiral ridges, which are about ten on the base and seven to nine on the upper surface of the whorls.

May 4, 1889.

The armature of the mouth is a character which does not appear until full maturity, so that I do not regard its non-existence in the Challenger specimens as important. The other characters seem to agree closely with Watson's figure and description, and, taking into consideration the known variability of the abyssal shells and among the Blake specimens of this species, I do not feel justified in separating the Blake shells specifically from *B. costulata.* If I am correct in the identification, this material enables me to add a good deal to the knowledge of the species and genus. The dried remains of the animal in one specimen bear a pellucid multispiral operculum a little more circular in outline than that of *Seguenzia*, but otherwise precisely like it.

The aperture in the adult is strongly thickened a little distance within its margin, which remains sharp. The projecting peripheral part is a little bent in, recalling the aperture of *Seguenzia.* The callus on the body is thin and smooth, that within the outer lip is broad, thick, iridescent, and deeply grooved parallel with the external spirals, producing four or five ridges between the grooves above the carina and a larger number of rather smaller ones below it. The columella is thickened concave and strongly reflected, its basal extreme terminating in a stout tooth-like twist of the margin, beyond which is a deep sulcus in the callus extending nearly across the base, in the middle of which rises a solitary stout tooth-like ridge. The walls of the umbilicus are nearly smooth, and as regards the individual turns are somewhat concave. The nucleus in this form gives the impression, after very close scrutiny of several fresh specimens, that it is really laid at right angles to the original axis and half immersed in the first post-nuclear turn. This is masked by the fact that the nucleus proper occupies less than a single turn, and appears thus more normal than it really is, if my suspicions are correct.

Solarium reticulatum Philippi is referred to this genus by Watson, and is said to have been dredged by the Porcupine at various stations in the North Atlantic.

FAMILY DELPHINULIDÆ.

Genus LIOTIA GRAY.

Liotia Gray, Syn. Brit. Mus., 1840 (no description, type *Delphinula cancellata* Gray); P. Z. S. 1847, p. 145.

This group was separated from *Delphinula* Lamarck (*Angaria* H. & A. Adams) to comprise the small species with a thickened margin to the aperture and less brilliant nacre than the large forms. Gray's type was a cancellated species, and the genus *Liotia*, in the most restricted sense, will comprise those species which have numerous varices or radiating circumambient ribs cancellated more or less by spiral sculpture.

Those species having a single varix marking the finally adult condition, generally with strong spiral ridges on the periphery, which may or may not be spinose, were separated by H. & A. Adams under the name *Arene.* Their diagnosis was not of the best, and comprised several characters certainly not of generic value. I am unable to see any characters in the subgenus *Liotina* Munier-Chalmas which should separate it from the typical *Arene.*

Another group, which in my opinion belongs here, is *Lippistes* Montfort, based on the *Argonauta cornu* of Fichtel and Moller. This is not the *Argonauta cornu* of Chemnitz, as has hastily been assumed by some authors. The latter is apparently an *Atlanta* or *Oxygyrus.* Montfort's figure represents a shell which does not appear to differ from the forms named *Daronia* by Arthur Adams, and *Ilaira* by H. & A. Adams, the quadration of the aperture in the latter being a merely specific incident due to its sculpture, and probably not permanent in all individuals of the same species. If, however, the disjunction of the latter part of the last whorl be considered sufficient to separate it from *Daronia* proper, where the whorls, though rolled in nearly the same plane, are contiguous, *Ilaira* must take its place with *Lippistes* proper, which has this character, while the final term of the series is afforded by *Laxispira* Gabb, a section which may include *Delphinula nitida* Verrill, in which all the whorls are lax, and to which *D. laxa* Say (if not a monstrosity) may also belong. The latter has been referred to the Rudistes by Tryon (Man., II. p. 309), but this must be due to some confusion of types. Mr. Say's original description and very good figure are incompatible with such a reference. There is much more probability that the type of *D. laxa* was a deformed *Natica*, as Say himself suggests. He describes it as a recent marine shell, inhabiting the coast of South Carolina among other marine shells. No suggestion of its being a fossil is anywhere made by Say, nor are any Carolinian Rudistes known. But as he says nothing of its being pearly, and compares it to *Natica*, it is probable that it does not belong to the group now under consideration.

Laxispira would appear to be without a varix or thickened ring at the extreme end of the adult coil; but this cannot be positively asserted, as but a very few specimens of these remarkable shells have ever been collected. *Tubiola* A. Adams would appear to bear much the same relation to *Cyclostrema* that *Ilaira* does to *Lippistes.*

The characteristics of the *Liotiæ* and their relatives are not those usually made use of for diagnoses. Some *Liotiæ* are most brilliantly pearly (e. g. *L. fenestrata* Cpr., of California); others when not perfectly fresh do not show a trace of nacre. Yet even these (*Arene cruentata* Mühlf. for example), when perfectly fresh and closely examined, show a very well marked varnish of pearl about the aperture. I have not seen any species, when perfectly fresh, which did not show at least a little nacre, though the majority do not show any when dry and "dead."

Arthur Adams describes the operculum in some Japanese species as horny, hispid, multispiral, and having an external limy layer composed of small grains like beads, spirally disposed. In *Arene cruentata* I find the operculum solid, thick, multispiral, with hardly a trace of horny matter except at the margin. Externally it is concave, with a small central pit corresponding to a small round elevation on the inner side. It is thinner here than elsewhere, and weathered opercula have always a central perforation.

The minute variegated *Liotia* (*Arene*) *miniata* of the West Indies has a similar operculum, as does *A. tricarinata* Stearns. *L. Briareus* Dall has an operculum like that described by Arthur Adams, almost wholly horny, externally hispid, with a row of beady granules on each whorl of the operculum. In *Liotia Bairdii* the operculum seems to want even the granules, and to be wholly horny.

The sculpture is of two kinds; one, a fine shagreening which generally covers the whole surface and is only visible under a lens; it seems to be invariable in the same species. The other sculpture consists of spiral ridges, or of scales, spines, knobs, etc., which are very inconstant and not characteristic even of the species in some cases. An examination of the dentition shows it closely related to that of *Delphinula*, as might have been expected.

The umbilicus varies from barely pervious (*L. Riisii* Dkr., etc.) to nearly plane in the genus, and from perforate to wide in different individuals of the same species, much as with some of the small Gibbulas. The elevation of the spire often differs considerably in different specimens of the same species, and the color markings are admitted on all sides to be as variable as they are bright and elegant.

The species of our southern coast and the Antilles appear to be as follows: —

LIOTIA, Section ARENE.

Liotia Briareus Dall.
Liotia Bairdii Dall.
Liotia Riisii Dunker.
Liotia miniata Dall.
Liotia cruentata Mühlf.
Liotia variabilis Dall.
Liotia tricarinata Stearns.

Subgenus LIPPISTES.

Lippistes acrilla Dall.
Lippistes amabilis Dall.

Subgenus LAXISPIRA.

Laxispira nitida Verrill.

"*Circulus*" *formosissimus* Brugnone of the Mediterranean is also a *Lippistes*, allied to *L. acrilla*.

"*Delphinula*" *tuberculosa* Orbigny (*tuberculata* on the plate, which was published first, *Trochus Schrammi* of Fischer according to the Beau catalogue) is almost certainly a *Fossarus*. *Cyclostrema Schrammi* Fischer may perhaps prove to be an extremely young *Lippistes*.

Liotia (Arene) Briareus Dall.

Plate XXIV. Figs. 5, 5 a.

Turbo (*Liotia*?) *Briareus* Dall, Bull. M. C. Z., IX. p. 52, 1881.

Habitat. Station 60, off Havana, in 80–480 fms. Station 20, off Bahia Honda, Cuba, in 220 fms., bottom temperature 62°.0 F. Station 166, off Guadelupe, in 150 fms., sand, bottom temperature about 60°.0 F., one living specimen. Station 272, off Barbados, in 76 fms., sand and shell.

The alcoholic specimen was well preserved. The operculum has been already referred to. Its outer margin is produced into a thin lamina, which persists, and splits radially, giving a hispid appearance to the outside surface of the operculum, which contains about twenty turns. The inner surface is golden brown, very polished, and with a small central knob corresponding to the deep indentation of the outer surface. The muzzle is long and rounded; the tentacles long and slender; the eyes large and black on distinct pedicels. The epipodial fringe shows a moderate lobe of triangular shape just behind the eye, but not extended to the eye peduncle; and there are four well-marked long lateral processes on each side as large as the tentacles, and two more smaller ones peep out from under the edges of the operculum. The foot is rather broad, squarish and simple in front, rounded behind, short. The sides of the foot are yellowish with numerous brown specks; there are some specks of the same kind between the tentacles. Front of the head devoid of lappets or other appendages. With the above exceptions the exposed parts are yellowish. There is a single rather narrow gill. The anus forms an elongated papilla. I could find no jaw. The radula is small and short The formula is $\frac{x}{1}+\frac{5}{1}+\frac{1}{1}+\frac{5}{1}+\frac{x}{1}$. The rhachidian tooth is like that of *Delphinula;* there are five simple-cusped broad-based laterals, the fourth and fifth larger than the inner ones. There are numerous slender simple uncini with long scythe-shaped cusps.

The shell of this species is subject to extraordinary variations. Beside the normal and typical form, figured with erect long channelled spines, there is a variety in which the umbilicus is nearly closed and the spines rather short. These specimens are also of a darker and duller red, and perhaps a little less elevated.

A still more remarkable variety is destitute of any spines or ridges whatever. The general form is the same, the places of the spiny spiral ridges are marked by the red color and the interspaces by white; yet there is nothing left of the ridges but the color, except on the very early whorls. The surface shagreening is retained. The shell is rose-colored. For the first I would propose the varietal name of *perforata,* and for the second that of *aspina.*

This species may be distinguished from *L. Bairdii* by the sharp wavy shagreening of its surface and the heavy shelly coat on the operculum, in general also by the larger umbilicus, flatter base and basal sculpture, and by the long, erect, thin trough-like spines. The strong carina or ridge bordering the umbilicus seems to be constant even in the variety *aspina*, while in *L. Bairdii* the sculpture rounds pretty evenly toward the smaller and hardly sculptured umbilical perforation.

Liotia Bairdii n. s.

Plate XXXIII. Fig. 8.

Shell of much the same general form as *L. Briareus*, but having noduled instead of spinose ridges and a finer and less evident surface sculpture, which follows the incremental lines, and is not wavy, raised, and sharp, as in *Briareus*. On the last whorl there are six basal, two peripheral, and three superior revolving ridges. The suture is channelled, and the middle one of the three upper spirals is smaller than the two others, which gives a slight tabulation to the spire. It has five whorls and a small smooth nucleus. Like *L. Briareus*, there is hardly any varix at the aperture of the adult, though this is slightly reflected; the margin is machicolated by the squarish ends of the spiral ridges, when these are strong. The umbilicus is small, the base in the adult rounds into it, within there is a single rounded spiral ridge, but no spines or nodules. The outer basal spiral is larger than the others, and separated from the others by wider channels. The color is whitish, more or less maculated, or wholly overspread by a dull livid red, much less attractive than the delicate color of the preceding species. The size of the largest specimens is rather less than in *Briareus*. Operculum horny. Max. alt., 6.0; max. diam., 6.0 mm.

L. Bairdii var. *trullata*. Shell having the nodules produced into squarish spines, which are produced parallel to the surface of the whorl and flattened, with fine longitudinal striation outside. These widen toward their distal ends, and recall the appearance of trees which have grown exposed to a steady wind in one direction. They are hardly at all concave on the under side, and are pretty uniform over the base and all the rest of the shell, smaller on the smaller spiral ridges.

Habitat. Station 2, in 805 fms.; Sand Key, in 15 fms.; Sigsbee, off Havana, in 127 fms. Also at Stations 2595, 2596, and 2612 of the U. S. Fish Commission, in 50–60 fms., twenty miles off the North Carolina coast, and at Stations 2317 and 2318, living, in 45 fms., off Key West.

Liotia tricarinata Stearns.

Architectonica tricarinata Stearns, Proc. Bost. Soc. Nat. Hist., for 1872, p. 23, Jan., 1872.

Habitat. West of Florida, in 15 fms. U. S. Fish Commission Stations 2598, 2608, 2610, 2615, 2617, and 2619, in 14–22 fms., gravel, off the coast of North Carolina. Caloosahatchie Pliocene beds, near Fort Thompson, on the Caloosahatchie River, South Florida, Dall.

Some of the fossil specimens of this very pretty little species are nearly twice as large as any which have yet been dredged in the recent state.

Liotia miniata n. s.

Plate XXVIII. Fig. 11.

Shell minute, white, picked out with streaks of pale brown, or dots, or radiating blotches of bright rose-color. Whorls about three, surface finely shagreened in a granular manner; no radiating sculpture other than incremental lines; spiral sculpture of, on the last whorl, one generally minutely nodulous small spiral rib at the suture, one strong spiral not nodulous near the periphery, another at the periphery, and on the edge of and within the wide umbilicus two or three very strong evenly noduled spirals, the outer forming the border or umbilical carina, the others ascending within the umbilicus, all separated by very deep channels. On the outer surface there are occasionally fainter intercalary spirals. Suture distinct, hardly channelled. Aperture circular, slightly varicose in the adult. Operculum chiefly calcareous, multispiral, concave, with a central perforation when weathered. Max. diam., 2.5; min. diam., 2.0; alt., 2.0 mm.

Habitat. Barbados, in 15 fms. Nassau, N. P., and Samana Bay, Santo Domingo, dead on beach, Dall.

This pretty little shell has much the general appearance of *L. tricarinata* on a much smaller scale and with a different umbilicus and details of sculpture.

Liotia variabilis n. s.

Plate XXIII. Figs. 2, 2a.

Shell trochiform, white or waxen, of about five turns, with a minute smooth nucleus; suture distinct, channelled; radiating sculpture of sharp close elevated lamellæ, a good deal like those of *L. Briareus* but less elevated and irregular, more nearly conforming to the lines of growth; these are continuous over the whole surface. Spiral sculpture consisting, on the last whorl of the adult, of a ridge near the suture, with a much smaller adjacent one just outside of it; a very stout spiral near the periphery, another at the periphery, another below and slightly within the periphery which forms the basal margin. There is a stout rib with pointed nodules at the edge of the umbilicus, a groove outside this, then a much finer spiral with rounded nodules; between this and the basal margin the flattened area has five or six fine simple raised spirals, crossed by the surface lamellæ. The umbilicus is small, mostly smooth, with, in the typical form, a single spiral thread bearing sparse lamellar spines near the umbilical carina. Aperture nearly circular, hardly reflected, produced above with a small row of faint round tubercles on the lower edge just within the margin. Operculum multispiral, horny, dotted with bead-like limy granules. Max. diam., 6.0; min. diam., 5.0; alt., 4.5 mm.

Variety *microforis*. Shell with radiating undulations which granulate the basal sculpture, and with the last whorl so compactly coiled as nearly or quite to close the umbilicus.

Habitat. Station 134, near Santa Cruz, in 248 fms., sand, living, bottom temperature 54°.5 F. Station 22, off Bahia Honda, Cuba, in 220 fms., bottom temperature 62°.0. Stations 296 and 300, Barbados, in 82–84 fms., bottom temperature 60° to 61°.5. Barbados, 100 fms. · Sand Key, in 80 fms. U. S. Fish Commission Stations 2595 and 2610, off the coast of North Carolina, in 22–63 fms., gravel.

The variety: Station 36, off Cuba, in 84 fms., bottom temperature 60°.0. Off Sombrero, in 54 fms. Off Havana, Sigsbee, in 80 fms. Station 273, Barbados, in 103 fms., bottom temperature 59°.5. Station 247, off Grenada, in 170 fms., gray ooze, bottom temperature 53°.5 F.

The spiral sculpture in this species may be, and generally is, either nodulous, or marked with strong imbrications which sometimes become spines. In some specimens and especially in young ones we may have the imbrications absent and the shell marked with flexuous radii, which sculpture the interspaces, but not, or only slightly, the carinæ. In other specimens the fine spirals are absent from the base, which is then marked with flexuous raised radii, or by irregularly elevated, radiating, not very prominent granulations. The young shells are proportionally less elevated, and have a larger umbilicus. No trace of color has been observed on any of the specimens examined.

Subgenus LIPPISTES Montfort.

Lippistes acrilla n. s.

Plate XXXII. Figs. 6, 11.

Shell thin, white, planorboid, of three and a half whorls; radiating sculpture of about fifteen ridges, faint on the base and summit, making small nodules where they cross the fine spirals, and prominent and strong on the periphery between the three peripheral carinæ. Other radiations are only due to lines of growth which are sometimes slightly elevated. Spiral sculpture of three prominent and strong peripheral ridges, of which the uppermost forms the chief periphery, the others being slightly nearer the axis; between these, nearly square deep reticulations are formed by the radiating ridges before described. Beside these there are three faint spirals on the upper and three on the basal surface, nodulated at their intersections with the radii. Umbilicus ample; inner margin of the aperture nearly circular, the outer part modified by the sculpture. Max. diam., 4.3; min. diam., 3.0; alt., 2.0 mm.

Habitat. Garden Key, Tortugas, Florida, among small beach shells sent by a correspondent to the U. S. National Museum.

The specimen looks as if not quite adult. It differs from *L. formosissima* Brugnone, of the Mediterranean, in having three strong peripheral costæ instead of one, and three above and below instead of one in each situation.

Lippistes amabilis n. s.

Plate XXXII. Figs. 9, 12.

Shell small, yellowish white, planorboid, of about four whorls, including a minute smooth nucleus. Whorls rounded, barely touching, not constantly contiguous but normally enrolled. Spiral sculpture of on the upper side six, on the periphery four, and on the base six rounded threads, the peripheral ones rather larger than the others, all with narrower interspaces; radiating sculpture comprising, first, fine elevated lamellæ covering the whole shell evenly and giving it a slightly spongy aspect; secondly, on the last whorl, about ten elevations, not perceptibly continuous over the top of the shell but prominent over the periphery and reflected backward like incomplete varices. The outer whorl is coiled over these so that the whorl inside only touches the outer one by these prominences. They are not continuous over the base, but within the ample umbilicus are two rows of small prominences corresponding in number to those on the periphery. Aperture circular, with a complete circular varix which is radiately crenulated. The apex is sunk below the top of the last whorl. Max. diam., 5.0; min. diam., 3.0; alt. (or diameter of terminal varix), 2.0 mm.

Habitat. Off Havana, in 80 fms., Sigsbee.

This most lovely and very remarkable little shell is like nothing else which has been described as far as I know, and is so distinct as to need no comparisons.

FAMILY CYCLOSTREMATIDÆ.

Genus VITRINELLA C. B. ADAMS.

Vitrinella Holmesii DALL.

Cochliolepis parasiticus Holmes, Post Pliocene Foss. S. Car., p. 93, pl. xiv, figs. 9, 9 a, b, 1860. Not of Stimpson, 1858.

I have already called attention to this species.

Vitrinella (Episcynia?) multicarinata n. s.

Vitrinella multicarinata Stimpson, MS., in U. S. Nat. Mus.

Shell small, depressed, translucent whitish, polished, four or five whorled, carinated. Radiating sculpture of flexuous incremental lines, faint above, more strongly marked on the base; a sharp peripheral thread or carina (below which the suture is applied) is microscopically serrate by the lines of growth; above and below this are two or more carinæ, faint angulations of the surface, conspicuous in the fresh shell as the epidermis is produced into a fringe upon them, though not on the peripheral thread. Whorls moderately rounded above and below. Umbilicus deep, scalar, not very wide, with vertical walls, vertically striate, and sometimes with a few spiral grooves; aperture transversely ovate, margins simple, sharp; epidermis thin, yellowish, conspicuous only on the carinæ. Max. diam., 3.0; alt., 1.5 mm.

Habitat. Off Hatteras, in 15 fms., U. S. Fish Commission. Florida, Stimpson and Jewett.

This species differs from *V. gemma* Holmes, in being more depressed and having more keels. It is also smaller.

Genus CYCLOSTREMA Marryat.

Several species of this group are found in the western part of the Atlantic, though for the most part in the cooler area. Among them are *C. trochoides* Jeffreys, which has received the name of *C. affine* from Prof. Verrill. A careful comparison of types leaves no doubt as to the identity of these two forms, for which Jeffreys's name has precedence.

Of the identity of *Cyclostrema diaphanum* Verrill (1884) with *C.* (*Trochus*) *fulgidus* Jeffreys (1883), as claimed by Dr. Jeffreys, I am not at all satisfied. All these small shells are very similar, but so far as they have any characters these two would appear to differ. On the other hand, *C. Dalli* Verrill (described in 1880) is extremely close to and probably identical with *C. fulgidus*. *C. Dalli* var. *ornatum* Verrill would appear to be a good species, and possibly may be a *Mölleria*, as a specimen I have from near Cape Fear shows a shelf, as if for the thick operculum, inside the extreme margin.

A few interesting species can be added to the list, though some doubt attaches to the generic reference in the absence of the soft parts and operculum.

Cyclostrema turbinum n. s.

Plate XXXIII. Fig. 5.

Shell small, thin, subconic, with four rounded whorls and a minute glassy nucleus; radiating sculpture of fine oblique incremental lines, which on the early whorls rise into very fine threads, visible crossing the interspaces of the spiral sculpture; spiral sculpture of (on the last whorl) about seven strong smooth even cinguli on the top of the whorl, and fourteen or fifteen more rather smaller from the periphery to the brink of the umbilicus; there are also a few finer ones, especially three near the suture, and occasionally some spiral striation faintly indicated; on the top of the whorl the interspaces are about twice as wide as the threads, but not so wide on the base. The whorls, periphery, and base are evenly rounded, the suture distinct, not channelled; the umbilicus perforate, with smoothish walls; aperture half as high as the shell, oblique, nearly circular, with sharp, simple, slightly expanded edges. Max. diam., 3.25; alt., 2.75 mm.

Habitat. Off Havana, in 80 fms., Sigsbee.

The brownish tint of the single specimen may be accidental; when fresh, it is probably white.

Cyclostrema pompholyx n. s.

Plate XXVIII. Fig. 9.

Shell white, polished, thin, with three rounded, rapidly enlarging whorls. Sculpture of fine incremental striæ; suture deep but not channelled; whorls very round, but the spire hardly rising above the last whorl; base rounded, with a very narrow umbilicus, into which the whorl descends without any angle or other change of curve; aperture large, circular, the upper part a little angulated at the suture, margin simple, sharp, somewhat expanded but hardly reflected. Max. diam. of base, 4.2; min. diam., 3.0; alt., 3.0 mm.

Habitat. Station 2, Gulf of Mexico, in 805 fms.

I am in doubt as to the generic place of this species, so simple in its characters and without the soft parts. I had thought of putting it under *Choristes* or with *Vitrinella*, and finally, in placing it here, feel by no means satisfied that the choice is a correct one.

Cyclostrema cistronium n. s.

Shell small, white, with a polished nucleus, one and a half rounded and as many more carinated whorls; spire depressed; radiating sculpture of fine close flexuous threads, which appear chiefly in the interspaces of the spirals, giving the surface a minutely punctate appearance; these extend over the whole surface except of the nuclear whorls; spiral sculpture of on the summit seven or eight, between the carinæ six or eight, and on the base ten or fifteen extremely fine threads, even and uniform, with about equal interspaces, some a little granular from the radiating sculpture; beside these there are three very strong carinæ; one forms the margin of the nearly flat spire, the second extends horizontally just below the periphery, the space between them deeply excavated; the third forms the edge of the funicular narrow deep umbilicus. The base is conical, excavated just within the peripheral carina; it rises to the edge of the umbilicus, which is marked by a strong thread, and within is vertically striated. The last whorl descends from the general plane, and finally becomes separated from the body whorl; the margin is simple, sharply angulated by the carinations, otherwise the aperture would be ovate, with the columellar side somewhat excavated. Alt., 1.6; max. diam., 2.0 mm.

Habitat. Off the coast of North Carolina, in 22–63 fms., sand and gravel, in the warmer area.

This is a very strongly marked species, in its sculpture recalling *C. Verreauxi* Fischer, which is larger, less elevated, with a proportionally larger umbilicus, and has not the deflected aperture. The latter recalls the characters of *Tubiola divisa* J. Adams, which is otherwise very different.

Cyclostrema granulum n. s.

Among the small shells from Samana Bay I have found a little *Cyclostrema*, which, as it appears undescribed, I have called *C. granulum*, and which is about 1.0 mm. in height and breadth. It is much the shape of *C. turbinum*, but more elevated and compact, having ten or twelve fine strong spiral cinguli, under which are finer radiating raised incremental lines. It is white with a rounded base and perforate umbilicus, three whorls, a nearly circular aperture, with slightly thickened or expanded margin. For so small a shell it seems remarkably solid and strong. It must be one of the smallest of the genus.

Section GRANIGYRA Dall.

Shell covered with small pustules or granules, like those on *Poromya* or *Plectodon*.

Cyclostrema (Granigyra) limatum n. s.

Shell small, white, almost exactly the shape of *Trochus fulgidus* Jeffreys, but a little smaller, with three extremely rounded whorls covered with small close-set irregular granulations of nearly uniform size like sand-grains; base with a small perforate umbilicus, into which the whorl rounds without carina, callus, or break of any kind. Aperture circular, margins thin, sharp, uniform, not reflected. Max. diam., 2.5; alt., 2.5 mm.

Habitat. Station 19, off Bahia Honda, Cuba, in 310 fms.

This singular little shell is a typical *Cyclostrema* in its conchological features, except for its granular surface. The latter recalls that of *Poromya*, but is finer and less regular.

Super-Family DICRANOBRANCHIA.

Family HALIOTIDÆ.

Genus HALIOTIS Linné.

Haliotis Pourtalesii Dall.

Haliotis (Padollus) Pourtalesii Dall, Bull. M. C. Z., IX. p. 79, 1881.

Habitat. Bed of the Gulf Stream, in 200 fms., near the Florida Reefs, Pourtalès, March 31, 1869.

No additional information has yet been received in regard to this species. The type specimen was destroyed in the great fire at Chicago, together with the other collections of the Academy of Sciences and of Pourtalès, which had been intrusted to Dr. Stimpson for study. It is the only representative of the genus on the eastern coast of America.

FAMILY SCISSURELLIDÆ.

Genus **SCISSURELLA** ORBIGNY.

Section SCHIZOTROCHUS MONTEROSATO.

Scissurella crispata FLEMING.

This widely spread species has been found off the eastern coast of the United States by the U. S. Fish Commission, the Challenger, and by Dr. Rush of the U. S. Navy.

Section SCISSURELLA s. s.

Scissurella alta WATSON.

Scissurella alta Watson, Chall. Rep. Gastr., p. 113, pl. viii. fig. 1, 1885.

Habitat. Off Barbados, in 100 fms., Blake Expedition. Off Culebra Island, Antilles, in 390 fms., Challenger.

A single specimen of this interesting species was found in the mud filling a larger shell from the above locality.

FAMILY PLEUROTOMARIIDÆ.

Pleurotomariidæ Dall, Bull. M. C. Z., IX. p. 77, 1881.

I cannot follow Dr. Fischer in placing the *Scissurellidæ* in this family. The differences of the radula alone seem sufficient to separate them, and the absence of cirri on the epipodium, as well as the peculiar lappets of *Scissurella*, confirm the division, from my point of view.

Genus **PLEUROTOMARIA** SOWERBY.

Pleurotomaria J. Sowerby, Min. Conch., III. p. 139, pl. cclxxviii., Dec., 1821.
Pleurotomaire (in) Defrance, Tabl. des corps Foss., p. 114, 1824. (No description.)
Pleurotomaria "Defrance," J. de C. Sowerby, Min. Conch., VII. p. 69, pl. 640, Nov., 1844.
Pleurotomaria Dall, Bull. M. C. Z., IX. p. 78, 1881. H. Woodward, Geol. Mag., II., 1885, p. 433.

Dr. H. Woodward in his excellent paper on this genus has overlooked the application of the name *Pleurotomaria*, and the statement of its essential character, by James Sowerby, in 1821. The facts are : 1. James Sowerby uses and defines the name in 1821, though he does not definitely adopt it; he refers it to no other author. 2. Defrance never published the name *Pleurotomaria;* he used a French form of it in his table of fossils, without a definition, and without claiming it as his own, or differentiating it from other older genera quoted by him, three years after its use by James Sowerby. 3. Other authors have referred to Defrance as the author of the name, but without stating any grounds for it, and without noticing Sowerby's original use of it. Hence it is evident that there is no published proof that the name is due to any one but Sowerby. What tradition may assert, or heedless quotation have established, is another matter, with which I do not feel that I have authority to deal.

Section PEROTROCHUS Fischer.

Pleurotomaria (Perotrochus) Quoyana Fischer & Bernardi.

Plate XXIX. Fig. 1. Plate XXXI. Figs. 1, 1 b, 1 c. Plate XXXVII. Fig. 5.

Pleurotomaria Quoyana Fischer & Bernardi, Journ. de Conchyl., V. p. 165, pl. v. figs. 1–3, 1856. Dall, Bull. M. C. Z., IX. p. 78, 1881. Crosse, Journ. de Conchyl., XXII. p. 14, 1882. Dall, in Agassiz, Three Cruises of the Blake, II. p. 69, fig. 289, Jan., 1888.

Habitat. Station 290, off Barbados, in 73 fms., coral sand, bottom temperature 70°.75. Station 296, off Barbados, in 84 fms., hard bottom, temperature 61°.5 F. Island of Marie-Galante, near Guadelupe, Fischer. Station 2354, off the coast of Yucatan, near Arrowsmith Bank (dead), in 130 fms., coral bottom, U. S. Fish Commission.

The first mentioned specimen was a little defective about the aperture, though living. It is in the U. S. National Museum. The second, also living, is perfect, and is now in the Museum of Comparative Zoölogy at Cambridge. The Fish Commission specimen, also in the National Museum, is broken somewhat at the aperture, but otherwise in good order. All these shells were of nearly uniform size. The measurements of the two Washington specimens are as follows. Max. diam. at base, 50.0 and 48.0; min. diam., 47.0 and 43.0; max. alt. of shell, 42.0 and 40.0; width of notch in both, 2.5 mm. Number of whorls, 10 and 9½. Height of the aperture, 15.0 and 13.5 mm.

The early two or three whorls are filled solidly with translucent yellowish or reddish shelly matter, and the nucleus, as far as can be observed, shows no trace of a notch. This form belongs to the section *Perotrochus* Fischer (1885), but I do not think the value of most of these sections is very great. They are merely convenient means of arranging large numbers of species which do not greatly differ from one another. The characters of the radula may, however, validate the present subdivision.

The animal in alcohol is of a yellowish waxen color, varied on the back of the tentacles, and on the upper part of the head behind the tentacles, with fine black transverse lines, corresponding to the wrinkles between the cuticular rugæ. This led to the suspicion that they were due to foreign matter, but both specimens presented essentially the same appearance. The whole surface of the body was more or less rugose. The parts above alluded to are finely transversely wrinkled. The rest of the body (excepting the base of the foot) is finely granulose, or furnished with minute close-set, rounded, short, projecting points or papillæ.

The head is moderately long and rounded much as in most *Trochidæ;* the muzzle rounded, its distal end forming a well-defined moderately papillose rounded-ovate disk; the mouth is about in the centre, with a deep sulcus extending in the median line below and breaking the continuity of the margin. The tentacles are long, slender, subcylindrical, rather bluntly pointed, and wrinkled in a longitudinal direction, probably from contraction induced by the alcohol. The eyes are small, round, and black; the cutis above them has a small central perforation, so that the office of a lens must be performed by the water having access to the cup-shaped cavity within. There is no lens present.

The upper surface of the foot is widely expanded at the sides, from a point a little behind the front edge of the foot to the posterior extremity. This expansion, though differing from the homologous organ in the *Trochidæ* in its form and arrangement, is identical with the epipodium in that family. It is broad, thin, and entire, and fringed, as is the free edge of the mantle, with a single row of small short slender papillæ. This extends back to the extreme termination of the foot, the two epipodial expansions not uniting behind. There are no cirri, tentacular filaments, lappets, or other projections to the epipodial margin, as in *Scissurellidæ* or *Trochidæ.* The upper surface of the epipodium is continuous with the upper surface of the foot, and is depressed and more finely granular than the outer part. About the centre of the upper surface of the body behind the shell is the operculigerous lobe, which is of a circular form and about 7.0 mm. in diameter. The depression between the epipodia extends to the posterior termination of the foot. In life the epipodia are thin and extended, like a supplementary mantle, and are kept closely applied to the shell as if supporting it; in this respect differing from the same organs in the *Trochidæ*, where they extend, like organs of touch, freely into the water on each side of the body, and only incidentally touch the shell.

The anterior margin of the foot is rounded, and perhaps double, but the duplication is evidently not deep, and is hardly visible in the contracted specimens before me. This organ is very muscular in this group. The posterior end is not very acutely pointed.

The operculum is nearly circular, small for the size of the shell, its greatest diameter being only 7.5 mm., and its smallest diameter 7.0 mm. Within this range it has ten narrow whorls, smooth or lightly striated with incremental lines on both sides, of a brown color, thicker toward the margin and having its central point impressed slightly from the exterior.

The length of the (contracted) foot is about 33 mm., the width between the tentacles is about 7 mm., and the tentacles are about 10 mm. long. The mantle is thin, its edge resembles that of the epipodia, but, as preserved, the individual papillæ of the fringe seem a little larger and stouter. In life they extend along the margin of the notch, and are visible from the outside. Behind the head and foot, in the two specimens dissected, the soft parts were totally decayed and lost, having probably been left too long out of alcohol in the tropical temperature after the draughtsman had made his drawings. Nothing remained of the gills, and only the anterior lobes of the mantle, the appearance of which in life is preserved by the drawings made from the living animal.

The cavity of the mouth is large, and the muscles which move the buccal mass are prominent and strong. There are no functional mandibles; the jaws, if such they may be called, are disproportionately small and weak. They consist of two quadrate smooth horny pieces about 1.5 mm. square, meeting above in the median line at the anterior upper portion of the oral cavity. They are attached over their whole extent, flatly to the roof of the mouth, have no cutting edge, in fact are too soft and weak to cut anything, and evidently only serve the purpose of defending the surface to which they are fixed from the attrition of the teeth of the radula below them.

The radula is long and its central part is of a very dark red brown. There is a narrow pointed rhachidian tooth, with a slightly curved simple tip. The other teeth are arranged in three series. The laterals proper are twenty-six in number, and the line forms a very acute angle on each side of the rhachidian tooth, which would occupy a position a little within the apex of this angle. The largest laterals are those near the rhachidian tooth; they have simple broad cusps and narrower bases; a faint midrib was visible on some of them near the base. They grow gradually smaller and shorter from the centre outward, though preserving a general similarity of form; the outer five are without cusps, and are little more than pointed lamellæ. Outside of the laterals are two series of uncini; the inner series or major uncini are large, strongly curved, with scythe-shaped cusps, having from one to three denticles nearly as large as the principal cusp. Those nearer the rhachis have more and the outer ones have fewer denticles, the outer ones are also a little shorter and more slender. As nearly as I could determine there were eighteen (possibly twenty) of these uncini, their tips forming an arch raised above the median teeth and also above the minor uncini. The successive rows in a general view of the radula look like successive waves running in at an angle less oblique to the median line than the teeth on the rhachis. The minor laterals form a very numerous series of decidedly smaller and more transparent teeth, which series, though really inclined toward the median line at a very acute angle, appears parallel with it. The uncini so overlap and confuse with one another as to make it impossible to state with confidence the exact number in a single transverse series; I believe it to be more than forty, and probably less than fifty. They are slender, spatuliform, nearly straight transparent lamellæ, whose weakness contrasts strongly with the stout arched dentate broad-cusped major laterals.

The major and minor laterals respectively are set in series on a compact solid base, common to all of the teeth in that series belonging to one transverse set, and not very clearly separated from the basis of adjoining sets. This adds to the difficulty of obtaining the exact number in any one transverse set, where the teeth are so numerous and so compactly planted. I did not observe on any of the uncini such tufts or brushes as are described in connection with the radula of *P. Adansoniana*.

The tooth formula would be written, $R\left(\frac{21}{1}+\frac{5}{0}\right)+\left(\frac{18}{3-1}+\frac{45?}{0}\right)$, the middle tooth (R) and the right half of the radula being included in the formula.

Section ENTEMNOTROCHUS Fischer.

Pleurotomaria (Entemnotrochus) Adansoniana Crosse & Fischer.

Plate XXX. Plate XXXI. Figs. 3, 4, 5, 6. Plate XXXII. Fig. 10.
Plate XXXVII. Fig. 4.

Pleurotomaria Adansoniana Crosse & Fischer, Journ. de Conchyl., IX. p. 163, pl. v. figs. 1, 2, 1861. Dall, Bull. M. C. Z., IX. p. 78, 1881. Crosse, Journ. de Conchyl., XXII. p. 12, pl. i. figs. 1, 2, 1882. Dall, in Agassiz, Three Cruises of the Blake, II. p. 69, fig. 288, 1888.

Habitat. Station 278, in 69 fms., coral bottom, temperature 68°.0, dead; Station 276, in 94 fms., temperature 61°.0; Station 291, in 200 fms., stones, temperature 49°.75 F.; all near Barbados. Guadelupe, in 150 fms., Fischer.

The specimen from Station 291 is now (with the broken one from Station 278) in the Museum at Cambridge. It will be referred to as "specimen *a*." The other, now in the U. S. National Museum, will be called "specimen *b*." Their respective measurements are as follows. Max. diam. of base, 130.0 and 88.0; min. diam., 111.0 and 79.0; max. alt. of shell, 130.0 and 70.0; max. lat. of aperture, 60.0 and 41.5; max. alt. of aperture, 38.0 and 26.0; lon. of slit, 200.0 and 142.0 mm., in both cases a little more than half the length of the last whorl, which in specimen *b* measured, in all, 237.0 mm. Its operculum measured 35.0 mm. in greatest diameter.

The width of the slit is from 2.5 to 3.5 mm. in specimen *a*, which has eleven whorls. It is from 2.5 to 2.75 mm. in specimen *b*, which has ten whorls. The specimen from Station 278 was of a much more brilliant yellow than the two others, and the painting was somewhat different in each specimen from either of the others. The nucleus was uniformly filled with solid matter.

The soft parts in this species were a little better preserved than in *P. Quoyana*, since, in specimen *b*, the mantle to the anal commissure was intact, and the branchia upon it, as well as the anal termination of the intestine and the glands below it. The crop or stomach, and everything behind it, however, no longer remained. In specimen *a* only the body and head remained.

The external parts in life, as represented by the draughtsman, were reddish, finely tuberculated or punctate with yellow, thus reproducing the colors of the shell. In the preserved specimen the soft parts showed no markings, and appeared of a livid waxen hue, common to specimens preserved in spirits.

In a general way, the superficial characters resemble those of *P. Quoyana*, but there are some differences.

May 12, 1889.

The surface of the body is less rugose than in *P. Quoyana*, though it is very finely granular all over, with (in the contracted specimen) a velvety appearance. The head bears about the same proportion to the rest of the body, but the muzzle in front of a line joining the tentacles would be shorter, and the tentacles shorter, stouter, and more pointed. The eyes are very small, black, and similar to those of *P. Quoyana*.

The epipodia are similar in arrangement, but proportionately smaller than in that species, and while minutely papillose do not seem to have a special single fringe-like row of papillæ at the margin. The right epipodium extends forward as far as the front end of the foot, the left only to the anterior edge of the operculigerous disk. The difference is not nearly so great in *P. Quoyana*, where the left epipodium extends one half the remaining distance farther forward.

The most marked external difference between the two animals, as observable from the alcoholic specimens, consists in the character of the dorsal area between the two epipodia. The operculigerous lobe is very much larger in proportion (about 33.0 mm. in diameter), while behind it in the median line is a large, deep, ill-defined groove, extending to the posterior end of the foot. This is crossed by irregular strong transverse rugæ, which are often tuberculate or warty along what would be the margins of this groove. In *P. Quoyana* this dorsal depressed area is nearly smooth, while the part behind the opercular lobe, though more papillose than the rest, shows no such median groove or transverse rugæ.

. The foot is shaped as in *P. Quoyana;* the anterior margin appears narrowly duplicate, but this, owing to contraction, may be an erroneous deduction. In this specimen the sides stand about an inch in height (25.0 mm.); the sole of the foot is about an inch wide, and three inches long.

The lobes of the mantle correspond to the form of the shell, and are smooth except at the margin, where they are densely papillose, the papillæ being small but irregular in size and not arranged in rows, or if regular then in more than one row. This margin extends all round the mantle edge, and on both sides of the notch to its posterior commissure, toward which the papillæ become smaller and sparser. At the end of the commissure a few of the papillæ appeared to me at my first examination to be separated from those on either side by a gap, but a second scrutiny leads me to believe that this is accidental.

Within the mantle cavity, and on the inner surface of the mantle, rather close to the junction of the latter with the dorsum, are the gills. These consist of two series of flattened leaflets on either side of a smooth cutaneous ridge containing the branchial vessels, which extends from a point close to the anterior edge of the mantle, parallel with the slit in the shell, backward as far as the slit extends. A section is given in the diagram on page 434. The anterior end of this ridge is for a short distance free from the mantle surface, and terminates in a sharp point, near and up to which the branchial leaflets diminish in size, the outer series extending a little farther than the inner one. At the base of this free angle is a small swelling of the cutis, and just inside of it toward the median line is a small elevated hemispherical organ which appears to be an osphradium, or of a sensory nature. In the specimen (*b*) as preserved there are four branchial leaves in the length of a millimeter; the double series is about 45.0 mm. long (in specimen *a*, 81.5 mm.), so that each gill (in specimen *b*) contains about 360 single leaflets, which individually average about 3.5 mm. long, and 1.2 mm. wide at the base. The free part of the gill extends about eight millimeters.

The cavity of the mouth is large, and, as far as could be judged in the rotten state of the parts, a large thin-walled crop had position immediately behind it. The termination of the intestine was preserved; it forms a sigmoid curve on the surface of the mantle behind the anal commissure, where it is (specimen *b*) somewhat over 2.0 mm. in diameter, and gradually tapers to a stoutish point. The last seven or eight millimeters of its length are free, and when living it can doubtless be protruded outside the shell through the slit, for the discharge of fæces.

Immediately underneath this part of the intestine and spreading on each side, lobed in a shape roughly trifoliate, is a large gland or pair of glands meeting in the median line, and having a radiately rugose and irregular surface, in which the depressions look not unlike little oblong pits. Within and close to the mantle edge, one on each side of the commissure, is an oblong elevation containing an oblique opening, apparently the openings to these glands, which I suppose to have a renal function.

The operculum is very much larger absolutely and proportionally than in *P. Quoyana.* It measures (from the larger specimen) 54.0 mm. in maximum and 47.0 mm. in minimum diameter, is almost flat, and has about ten whorls, of which the central ones are rather indistinct. The outer surface is minutely sharply spirally striated, and a central spot the size of a pin-head is indistinctly indented. The inner side is polished, and shows a somewhat egg-shaped scar of attachment. It is of an amber-brown color. The extreme margin is thin and a little frayed.

The jaws (specimen *b*) are situated in the same place, and are of about the same form as in *P. Quoyana*, in fact are hardly larger than in that species, although the *P. Adansoniana* is so much larger than the former. They are, however, a little thicker and of a dark red-amber color.

The radula is about 40.0 mm. long by 7.0 mm. wide in its natural condition (specimen *b*). As the characteristic teeth are figured, it is not necessary to attempt a minute description in detail of each one.

The rhachidian or central tooth is pointed before and behind, or lozenge-shaped, with a median rib, and the point or cusp hardly curved over at all. It has somewhat the shape of a spear-head without barbs. The inner laterals have somewhat the shape of a scapula, being oval, marginate, with a median ridge from which a sort of recurved wing projects, near the base. There are fifteen laterals on each side of the median line, gradually becoming more simple in form as one follows the line outward; then, of the uncini, the first five are denticulated at the end and tufted, the next four are denticulated but without tufts, the rest, about forty-five in number, are more simple, and become still more simple and smaller toward the margin of the radula. The tooth formula would be written, R + (15) + (5 + 4 + 45), without trying to exemplify the minor uncinal armature.

Mörch (Malak. Blätt., XXII. p. 184, 1875) has described a supposed species of *Murchisonia*, — *M.* (*Murchisonella*) *spectrum*, — from St. Thomas, collected by Riise, measuring 2.0 by 0.75 mm., and having ten whorls.

From the small size of this shell I suspect it to belong to the *Turritellidæ*, — many of which have notches or waves, recalling those of *Seguenzia*, in the margin of the aperture, — or at least to some group unconnected with the typical *Murchisonia*.

FAMILY FISSURELLIDÆ.

Genus PUNCTURELLA LOWE.

Subgenus PUNCTURELLA s. s.

Puncturella circularis DALL.

Plate XXVI. Figs. 7, 7 b.

Puncturella circularis Dall, Bull. M. C. Z., IX. p. 75, 1881.

Habitat. Station 44, in 539 fms.

No more specimens have turned up, and a comparison of this and the following species with others contained in the Jeffreys collection confirms to that extent their distinctness.

Puncturella trifolium DALL.

Plate XXVI. Figs. 8, 8 b.

Puncturella trifolium Dall, Bull. M. C. Z., IX. p. 76, 1881.

Habitat. Yucatan Strait, in 640 fms.

Puncturella Watsoni n. s.

Shell small, greenish white, exactly resembling in sculpture *Cranopsis granulata* Seguenza (Chall. Gastr., p. 46, pl. iv. fig. 5), but differing from that species in having the slit of *Puncturella* instead of *Cranopsis*, and in having a rather higher and narrower and more conical form. The anterior and posterior slopes are not arched to the same extent as in the *C. granulata*, and the shell is proportionately shorter. The nucleus is small and prominent, and the shell as a whole includes two whorls. Max. alt., 3.0; max. diam., 2.5; max. lon., 3.8 mm.

Habitat. Near Barbados, in 100 fms. Station 20, in 220 fms., off Bahia Honda, Cuba. Off Yucatan, in 200 fms., U. S. Fish Commission.

A species of this genus from Patagonia, in deep water, shows a small but well marked verge in the usual position. One specimen has the eyes black and prominent. In another of the same lot the organs are wholly destitute of pigment.

Subgenus FISSURISEPTA Seguenza.

Fissurisepta triangulata Dall.

Puncturella (Fissurisepta) rostrata Watson, Chall. Rep. Gastr., p. 48, pl. iv. fig. 10, 1885. Not of Seguenza.

Having received a few specimens of the form figured and described by Mr. Watson, I have compared them with typical examples both recent and fossil of the original *rostrata* of Seguenza. There is no doubt that they possess certain features in common, but the form of the Antillean shell is much more triangular, less elevated, longer and more erect, beside the less obvious differences noted by Watson in his description, in regard to minor features of sculpture. I have therefore thought it best to give a new name to the Antillean shell. My specimens come from the coast of Yucatan, dredged in about 200 fms., by the U. S. Fish Commission.

Subgenus CRANOPSIS A. Adams.

Cranopsis asturiana Fischer.

Rimula asturiana Fischer, Journ. de Conchyl., XXX. p. 51, 1882. Watson, Chall. Report, Gastr., p. 45, pl. iv. fig. 4, 1885.

Habitat. Yucatan Strait, in 640 fms. Station 100, off Havana, in 250–400 fms. (living). Station 208, in 213 fms., hard bottom, off Martinique, bottom temperature 50°.5 F. Gulf of Gascony, in 2018 meters, Travailleur Expedition. Off Cape Florida, in 85 fms., U. S. Fish Commission.

Rimula capuliformis or *messanensis* of Seguenza, from the Tertiary of Reggio, Calabria, is a variety with slightly coarser and more irregular radiating ribs.

The Antillean specimens in general show less reticulation than those from Europe, the tendency being for the radiating ribs to be nodulous and finely shagreened, while the concentric sculpture is obsolete between them. They are also, as a rule, less elevated, and the posterior slope is more concave. But these differences are of degree, and merge into uniformity with a large series.

The two anterior lobes of the mantle do not unite, although the lobes of the shell do as it approaches maturity. The muzzle is short, round, and plain at the end. The tentacles are short and stout. The eyes are small and black. The epipodial line is marked by seven cirri, of which the pair next to the posterior pair are notably larger than the others. The gills are broad and symmetrical. A male intromittent organ is attached behind the base of the right tentacle, as in *Cocculinidæ, Addisoniidæ*, and *Neritidæ*. It is small, slender, and subcylindrical. I have not seen the soft parts of a female specimen.

Cranopsis ? erecta Dall.

Shell strong, erect, with regularly ovate base, a smooth prominent nucleus, and about one and a half cancellated whorls. Radiating sculpture of about eighteen strong riblets, each pair enclosing another somewhat less strong, and on each side of the latter a faint raised line, almost buried under the concentric sculpture. The primary and secondary radii rise above the general level of the concentric sculpture, the tertiary radii below it. The radii are strong rounded elevated threads. The concentric sculpture is of high close-set cord-like ridges, which are closely applied to and pass over the radii, leaving relatively deep pits in the space enclosed by the reticulations. The terminations of the ribs ornament the outer margin of the base, which is radiately grooved for a short distance under them. The interior is radiately striate with a fine groove, extending from the front end of the fissure to the margin. Externally the posterior slope starts from under a small beak, is straight and steep. From the beak the dorsal outline is at first nearly horizontally forward, then with a bold round curve falls more steeply than the hinder slope. The fissure is narrow, long, and sharp at both ends. A fasciole extends back from it toward the beak, and a soldered fissure forward to the margin. Inside, the fissure is surmounted by a short and flaring septum without buttresses, which extends about one fourth the distance from the internal apex toward the front margin. Externally the shell is grayish, and within subtranslucent white. Max. lon. of base, 10.0; max. lat. of base, 7.5; alt. of shell, 7.0 mm.

Habitat. Off the coast of North Carolina, at Station 2601, in 107 fms., gravel, bottom temperature 67°.4 F.

The fissure in this species is exactly intermediate between *Cranopsis* and *Puncturella* proper, so far as position is concerned. It is a little farther forward than in the typical *Puncturella*, and not quite as far as in *Cranopsis*. It is manifestly most nearly related to the latter by the groove extending forward from the fissure, and the sculpture is not unlike that of some specimens of *Cranopsis asturiana*. From this it differs by its profile, and the position and form of the fissure and septum. The bluff outline of the summit is far removed from the conical form of *P. noachina* and from the low and graceful arch of *P. asturiana*.

Genus **EMARGINULA** Lamarck.

Subgenus RIMULA Defrance.

If the step from *Cranopsis* to *Puncturella*, or the reverse, is not very long, on the other hand the distinction between *Cranopsis* and *Rimula* proper is not great. If the septum filling the original fissure curves in harmony with the shell, we have typical *Rimula* according to Mr. Watson's arrangement. If, on the other hand, this septum be convex with relation to the internal face of the shell, it is *Cranopsis*.

Rimula frenulata n. s.

Plate XXVIII. Fig. 4.

Shell ovate, resembling in general shape and color a single valve of *Limatula ovata* Wood; apex small, laterally compressed, sharp; nucleus very minute. Sculpture of fine distinct radiating threads, with an intercalary finer thread between nearly every pair. Concentric sculpture of about equally strong threads, which reticulate, but do not pass over or nodulate the radiations; they are not strictly concentric, being somewhat flexuous or broken at the sides, and sometimes bifurcated. Anal fasciole shallow, continuous from the fissure to the apex, narrow and marked with semilunar incremental ridges; fissure small, shaped like the top of an exclamation point (!). Interior glossy, the fasciole marked by two faint ridges extending to the apex; margin of the shell crenulated by the sculpture, apex reaching almost or quite as far back as the posterior margin, but a little raised above it, fissure a little variable in position, but mostly in the anterior third of the shell; dorsal surface gently convexly curved. Max. lon., 6.25; max. lat., 3.75; alt., 2.3 mm.

Habitat. West Florida and the Keys, U. S. Fish Commission.

This lovely little shell is remarkably distinct from any of the described species known to me.

Subgenus EMARGINULA s. s.

Emarginula cancellata PHILIPPI.

Emarginula cancellata Phil., En. Moll. Sicil., I. p. 114, t. v. fig. 15, 1840.

Habitat. Mediterranean, Madeira, Channel Islands, in 8–250 fms., Jeffreys. Station 21, off Cuba, in 287 fms. Off Havana, Sigsbee, in 127 fms., and near Barbados in 100 fms., all dead specimens.

These shells are a little more elegant in their sculpture than the European specimens, as the American *Cranopsis asturiana* are more elegant than those from the Gulf of Gascony, but I feel confident that they may fairly be referred to the same species.

Emarginula compressa CANTRAINE.

Emarginula sp. indet., Bull. M. C. Z., IX. p. 77, 1881.

E. compressa Cantraine, Bull. Acad. Roy. Bruxelles, IX. 2, 1835. Jeffreys, P. Z. S. 1882, p. 679, 1883.

Habitat. Yucatan Strait, in 640 fms.; off Havana, in 292 fms.; Station 19, in 310 fms.; Station 21, in 287 fms.; Stations 282 and 296, near Barbados, in 84–154 fms. Coast of Portugal, in 286–322 fms., Porcupine Expedition. Sicilian Tertiaries, Seguenza, etc.

All the specimens obtained were dead. I have compared them with the Sicilian fossils, and can confirm Dr. Jeffreys's identification of the two forms as indistinguishable. The whole shell is faintly spirally twisted, and the notch is not in the centre of the front edge.

I would observe that the number of nominal species of *Emarginula* in Reeve's monograph is probably far too great, as no account seems to have been taken of the variations due to age and station. As with other limpets, these are very important.

Subgenus SUBEMARGINULA Blainville.

Subemarginula octoradiata Gmelin.

Emarginula Rollandi Dall, Bull. M. C. Z., IX. p. 77, 1881 (not of Fischer).

Habitat. Sigsbee, off Havana, in 450 fms. Station 21, 287 fms.

The dead and imperfect specimens above referred to, on further study, appear to be young specimens of *E.* (*Subemarginula*) *octoradiata* Gmelin.

Genus FISSURELLA Bruguière.

Section CREMIDES H. & A. Adams.

Fissurella alternata Say.

Fissurella alternata Say, Journ. Acad. Nat. Sci. Phila., II. p. 224, 1822. Reeve, Conch. Icon. *Fissurella*, pl. xii. fig. 84, 1850.
Fissurella fumata Reeve, Conch. Icon. *Fissurella*, pl. ix. fig. 63, 1850.
Fissurella Dysoni Reeve, Conch. Icon. *Fissurella*, pl. xii. fig. 86, 1850.
Fissurella larva Reeve, Conch. Icon. *Fissurella*, pl. xiii. fig. 98, 1850.

A number of specimens of this species were collected at various stations, one in 805 fms., but of course these were not native to that or other great depths. Fresh specimens, however, were dredged by Sigsbee, off Havana, in 80 fms., and one still containing the soft parts at Station 276, near Barbados, in 94 fms. The United States Fish Commission has also dredged this species off our southern coasts, living in depths from 20 to 100 fms. The deep-water specimens (var. *Sayi*) are generally smaller, of an olivaceous cast, and with the color rays very faint or entirely absent.

Subgenus GLYPHIS Carpenter.

Glyphis fluviana n. s.

Plate XIV. Figs. 6, 6 a.

Shell low, conical, reticulated, white or translucent, variegated with gray or olive green lines or dots mostly radiately disposed; form variable with station, but usually in the young and in more normal adults both slopes of the cone are a little concave near the apex. The anterior slope slightly convex; the posterior slope straight or a little concave, and usually a little longer than the other, though these characters vary with station. Base is rounded oval, symmetrical and equal at both ends, with a thin simple margin. Sculpture of slightly irregular sudden enlargements of the shell, giving the effect of very narrow steps, over which some twenty moderately strong and as many more faint flattened radii seem to flow. In other specimens these step-like edges are produced into low laminæ, and the ribs are also stronger and at the intersections nodulous, or even a little scaly. Apex erect, truncate by the pore, which is circular, simple, and within margined by a narrow horseshoe-shaped callus. Exterior dull or unpolished, interior shining, with the color rays and ribs visible through the thin shell. Two specimens measure, alt. 4.0 and 6.0, lon. 10.6 and 9.5, lat. 6.6 and 6.5 mm., respectively.

Habitat. Station 21, in 287 fms. Station 2, in 805 fms. Off Havana, in 80 fms., Sigsbee. Station 247, near Grenada (living), in 170 fms., ooze, bottom temperature 53°.5. Station 272, off Barbados (living), in 76 fms., shelly bottom, temperature 65°.0 F.

The gills, anus, mantle margin, foot, muzzle, and tentacles are as usual in *Fissurella*. There is a row of about thirty minute epipodial cirri, continuous behind, and advancing as far forward as the adductors. The eyes are very large and black, the right tentacle at its base behind the eye, in the male, bears a well marked intromittent organ. This taken in connection with the discovery of a similar organ in *Cocculina*, in *Addisonia*, and in *Cranopsis asturiana*, would indicate that a majority of the deep-sea rhiphidoglossate limpets possess this organ, that it was originally present in most, if not all, of the Rhiphidoglossa having a shell of this general form, that the organ has become obsolete in the shallow-water forms except the *Neritidæ*, but that the deep-water forms, less modified by reason of their protective environment, have retained it. It also confirms my original reference of *Addisonia* and its allies to the Rhiphidoglossa, while the absence of such an organ in any of the Docoglossate limpets, so far as known, is significant. It is dangerous to assume too much in such cases, but I cannot help doubting if such an organ was ever developed in the Docoglossate line.

Genus FISSURELLIDEA Orbigny.

Fissurellidea limatula Reeve.

Fissurella limatula Reeve, Conch. Icon. *Fissurella*, pl. xv. fig. 115, 1850. Sowerby, Thes. Conch., pl. viii. fig. 204.

Habitat. Off Havana (dead), in 80 fms., Sigsbee. Coast of North Carolina, in 15–20 fms., U. S. Fish Commission.

This shell appears to be the species figured by Reeve without habitat. It is very variable in color, being often brown, reddish, or slaty and black. It was found living on marine grass at low water near Key West, by Hemphill. It recalls *F. callomarginata* Cpr. of the Californian coast, but is broader and more evenly shaped, and brighter colored. The more prominent ribs are often provided with fine vaulted scales.

The following additional species of this family were dredged dead from deep water, where they had been disgorged by fishes, or drifted by currents, etc., as they are distinctly littoral forms.

Glyphis barbadensis Gmelin.
Fissurellidea fasciata Pfr.
Fissurellidea (fragment) sp. indet.
Fissurella minuta Lamarck.
Fissurella cayennensis Lamarck.

Suborder DOCOGLOSSA.

The Docoglossate limpets of the littoral zone of the Antilles, most of which are also common to South Florida and the Central American and Mexican coast in suitable localities, all belong to the genus *Acmæa* as far as known. I have never seen a single representative of the *Patellidæ* from this region. Perhaps future researches will reveal some.

The positively determined shallow-water species are as follows, but they have many synonyms: —

Acmæa melanoleuca Gmelin (*P. albicosta* C. B. Ad. + *P. leucopleura* Lam. pars).
Acmæa punctulata Gmelin (*P. puncturata* Lam. + *P. pustula* Helb. non Lin. + *P. surinamensis* Auct. non Gmelin, + *P. cubaniana* Orb., etc.).
Acmæa punctulata var. *pulcherrima* Guilding.
Acmæa Candeana Orbigny (*P. notata* Gmelin, Chemnitz, Dillwyn, Lamarck, etc., not of Linné).
Acmæa onychina Gould (Rio, also Barbados).
Acmæa melanosticta Gmelin (Antilles).

The last mentioned has been sent to me from several sources as *Patella antillarum* Sowerby, but Philippi's figure of *antillarum* is more like a variety of *melanoleuca* than anything else. I do not know on what authority the name *melanosticta* rests. Gmelin's description certainly would not be sufficient. *Acmæa elegans* Philippi (La Guayra) is a synonym of *A. Candeana*, as I believe from the literature *P. confusa* of Guilding is intended to be.

The *melanosticta* above referred to, whatever be its proper name, is apparently an excellent species, and quite distinct from *A. Candeana*. Orbigny says that *A. melanoleuca* is a true *Patella*, but this does not agree with the only specimen I have seen, and the other species he describes as *Patella* are certainly Acmæas.

The comparatively small number of littoral species, compared with the multitude of forms on the Pacific coast, affords a notable discrepancy between the faunæ of the two regions.

The deep-water Docoglossa are few in number and peculiar. An account of most of them was published by me in the Proceedings of the U. S. National Museum for 1881, page 407. The progress of science during the last six years has enabled me to clear up several disputed points. The result is, that the genus *Scutellina*, long supposed to belong in this group, is (as will be seen elsewhere in this paper) definitely relegated to another suborder, while *Propilidium* has been proved to belong to the Docoglossa, a relation which had been strongly questioned. The character and number of the gills in *Propilidium* still remain in doubt. I suspect it has a single gill, like *Acmæa*, and that an elongated anal papilla has been taken for another or second gill.

In this connection, it may be observed that on several occasions in the last year or two the question of the position of the osphradia in *Acmæa* has been raised, and the importance of this item in classification has been highly rated by certain naturalists. Now I doubt extremely the value of the transcendental theories based on the osphradia and their position, with which we have been regaled at times. Nevertheless, for the comfort of those who do believe in them, and as one more fact to be added to the general stock, I will describe the position and character of the osphradia in *Acmæa*. These organs in the large limpets of the western coast of America are generally orange-colored, usually quite small, elongate oval, and little raised. They are often abortive or nearly so. When well developed, in most species (e. g. *Acmæa patina* and *A. spectrum*) they are smooth and polished, very little elevated, and have a glandular aspect and unbroken contour. In others (as *Ancistromesus mexicanus*) the surface is cellular or transversely corrugated like an abortive miniature gill, and even appears as if it were porous. They lose color and contract strongly in alcohol, and, unless one knows exactly where to look, he will not find them in an old-fashioned badly contracted alcoholic specimen. They are situated one on each side of the back of the neck as it were, or, more precisely, on the transverse portion of the integument above the head, and in front of the main pericardial chamber, in the angle formed by the neck and the inferior surface of the mantle over the head. They are not especially related to the Acmæan gill either in position or development. I may add, that I described them and their position about thirteen years ago;* but, as the state of science then was, in

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* Proc. Acad. Nat. Sci. Phila. for 1876, pp. 239, 240.

Patella they had been by distinguished naturalists referred to the generative apparatus. While showing this relation to be improbable, the spongy nature of the organ in some species led me to the suggestion that they might be of the nature of aquiferous pores. It was not until attention was called to them by the investigations of Spengel that their true nature was recognized.

Super-Family PROTEOBRANCHIA.

FAMILY ACMÆIDÆ.

Genus PECTINODONTA DALL.

Pectinodonta Dall, Proc. U. S. Nat. Mus. 1881, p. 409, 1882.

Shell resembling *Scutellina*, but with a blunt subcentral apex. Soft parts resembling *Acmœa* except in the following details. Animal blind, with the front part of the head between the tentacles and above the muzzle much produced upward and forward, extending considerably farther forward than the end of the muzzle, which is marginated with lappets at the outer corners. Jaw thin translucent. Gill exactly as in *Acmœa;* sides of foot and mantle edge simple, nearly smooth. Dental formula $\frac{0}{0\ (1 \cdot 1)\ 0}$; teeth large, with transverse pectinated or denticulated cusps, the serrated edge of which is turned toward the median line. The number of teeth is the smallest in any known limpet, and their appearance suggests that they are compounded of the normal three Docoglossal laterals, rather than due to the suppression of two and the exaggeration of the third. Nothing like it is described in the group.

Pectinodonta arcuata DALL.

Plate XXV. Figs. 3, 3 a, 3 b.

P. arcuata Dall, *loc. cit.*, p. 409, 1882.

This was obtained by the party on the Blake at Station 215, off St. Lucia, in 226 fms., coarse sand and broken shells, bottom temperature 51°.0; a large dead specimen at Station 185, in 333 fms., fine sand and dark brown mud, off Dominica, bottom temperature 44°.0; another, drilled, but in fresh condition at Station 161, in 583 fms., lava sand, off Guadelupe, bottom temperature 41°.0; another specimen was found entangled in a piece of coral from unknown depth, at St. Thomas, W. I.

The typical species was kindly compared with the species of *Scutellina* in the British Museum by friends in London, and reported to be different from any of them.

Super-Family ABRANCHIA.

Genus PROPILIDIUM Forbes & Hanley.

Propilidium ancyloide F. & H.

Plate XXXI. Figs. 2, 2b, 2c.

P. ancyloide F. & H., II. pp. 443, 444, pl. lxii. figs. 3, 5; pl. AA, fig. 4, 1850.

In the publication on deep-water limpets and chitons above referred to (Proc. U. S. Nat. Mus. 1881, p. 402) it was stated that an examination of the available data indicated that *Propilidium* belonged in the *Fissurellidæ*, where it might represent an imperforate *Puncturella*. More lately Dr. Jeffreys suggested its identity with *Cocculina*. I have never been able to procure a specimen of *Propilidium* with the soft parts preserved in spirits, and all that Dr. Jeffreys could send me for examination was a dried up fragment from a shell collected long since. By soaking this in weak potash solution I was able to restore it sufficiently to determine that the form of the head and tentacles agrees with the drawing of Forbes and Hanley, and that the dentition resembles that of *Pilidium fulvum*, as figured by G. O. Sars (Moll. Reg. Arct. Norvegiæ, pl. ii. fig. 12), except that the teeth are more slender and longer, and are somewhat more separated from one another. This shows that the genus belongs in the Docoglossa (in all probability near the *Lepetidæ*), and its standing will depend chiefly upon the character of its branchiæ, if it proves to possess them. None could be seen in the soaked specimen, but one could hardly expect any trace of them to remain there, even if originally present. The spiral and sinistral or posteriorly directed nucleus is common to all of the Abranchiata, but in nearly all of them it is lost before the creature attains maturity. In *Propilidium* with its septum we seem to have the process arrested half-way, the partition remaining unfinished and the nucleus persistent.

Prof. Verrill has described (Trans. Conn. Acad., VI. p. 205, May, 1884) an American species of this genus, which has until lately rested on its original type, a native of North European seas. *P. elegans* Verrill was collected off the coast of Virginia in 1395 fathoms. It has not yet been figured, and in treating of the soft parts Prof. Verrill does not mention the branchiæ. The animal is blind, like the *Lepetidæ*, and there are no epipodial filaments or fringe.

The occurrence of *P. pertenue* Jeffreys is also recorded from the American coast, in 640 fms., by Prof. Verrill, but the genus of the original *pertenue* is doubtful.

Genus LEPETELLA Verrill.

Lepetella tubicola Verrill.

Plate XXV. Fig. 6.

Lepetella tubicola Verrill, Am. Journ. Science, XX. p. 396, 1880; Proc. U. S. Nat. Mus., III. p. 375, Jan., 1881.
Lepetella tubicola Dall, Proc. U. S. Nat. Mus., III. pp. 408, 411, April, 1882.

This remarkable species does not appear in the Blake collection, but, in addition to the northern localities referred to in the publications above cited, it has been collected by the U. S. Fish Commission in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Florida, at Station 2376, in 324 fms., mud, in worm tubes, bottom temperature 46°.5 F. I have figured the dentition for comparison. A fossil specimen in the Jeffreys collection marked *Patella compressa* Rayneval from Monte-Mario, and according to Tiberi (*fide* Jeffreys, P. Z. S. 1882, p. 674) also found living in the Bay of Naples, appears to be indistinguishable from *Lepetella tubicola*, so far as the shell is concerned.

Subclass ISOPLEURA.

Some years ago,* in reviewing the article "Mollusca" of the new edition of the Encyclopædia Britannica, I pointed out that this Subclass is naturally divided into two large groups; one the *Polyplacophora*, including the Chitons, which possess a developed and functional foot and exhibit a metameric repetition of the primitive shell-sac; and the other the *Chætodermida*,† worm-like, with an abortive or rudimental foot, and (so far as known) without any evidence of a shell or its equivalent. But as the term *Polyplacophora* has long been in use for the Order including the Chitons, it is probably better to substitute a new term for the Super-ordinal group.

Super-Order POLYCONCHÆ.

Order POLYPLACOPHORA.

Suborder CHITONACEA.

Super-Family EOCHITONIA.

Head and tail plates similarly articulated.

It was early recognized by Carpenter that the Chitons were separable into two great groups, which he called the Regular and Irregular Chitons. To the former belong all the ancient paleozoic forms, which as far as known were all Leptoidea. The majority of the living Chitons are also classed in this group. The more specialized and peculiar, and especially the forms least embarrassed by their shelly cuirass, or in which it has become more or less diminished in size relatively to the whole animal, belong to the more modern group *Opsichitonia.*

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* Science, pp. 730-732, June 13, 1884.

† *Aplacophora* Fischer, Man. Conch., 1885.

The *Eochitonia* will comprise four families, whose exact limits remain to be defined by further researches, but which will for the present be regarded as the equivalents of the lettered subdivisions of nearly the same name in my paper on the Genera of Chitons (Proc. U. S. Nat. Mus., 1881, pp. 283–285). They are the *Leptoidea*, *Ischnoidea*, *Lophyroidea*, and *Acanthoidea.*

FAMILY LEPTOCHITONIDÆ.

Genus LEPTOCHITON GRAY.

This group comprises the great majority of the deep-water Chitons. It should not be confounded with *Leptochiton* H. & A. Adams, which is a heterogeneous assembly. Nearly all the species are white, with ferruginous or cinereous splashes, and of comparatively small size. They represent the paleozoic Chitons, which were all Leptoids. *Chiton eocenensis* Conrad, from the Alabama Eocene, is however a true *Chiton* of the restricted group typified by *C. squamosus* Born, or *C. tuberculatus* Linné.

Leptochiton pergranatus n. s.

L. t. elongata, mediocre elevata, regulariter arcuata, jugo nullo; pallide cereo tincta, interdum albida; valvis latioribus, apicibus nullis; v. ant. et post. plus minusve concava; v. post. sine mucrone elevata; sculptura ut in *L. cancellatus* sed granulis majoribus; areis lat. minus definitis; lam. suturalis, elongatis; *zona* lata, squamuliis tenuibus, criniformes, dense obsita. Lon. 12.0; lat. 6.5 mm.

Habitat. Station 192, near Dominica, in 138 fms., bottom temperature 63°.75 F.

This fine species is nearest the Atlantic *L. cancellatus* Sowerby, and the Japanese *L. fuliginatus* Ad. & Reeve. It differs from both in its concave or excavated instead of convex terminal valves, in the absence or obsolete condition of the posterior mucro, in its much larger and more regular granules, and in the subdepressed appearance also of the part of the median valves near the girdle on each side. It is larger than *cancellatus*, and smaller than *fuliginatus*, and without the dingy blackish painting of either. *L. cancellatus* is narrower, higher, and with a sharper median angle. In *L. fuliginatus* the middle valves are shorter from front to back, the sutural laminæ smaller and much more triangular. There is no sign of a mucro on these valves, but in *L. pergranatus* there is a beginning of one, quite perceptible. The latter is a proportionally wider and flatter species, with a stronger and more prominent girdle densely set with elongated silvery scales like short stiff gray hairs; these form a pretty fringe at the periphery. The sculpture follows the pattern of *L. cancellatus*, but the lateral areas are less clearly defined, the granules are more clearly cut, more regularly arranged, and larger than in any of the species hitherto known. There are twelve gills on each side, reaching forward to about the middle of the sixth valve.

Genus **HANLEYIA** Gray.

Hanleyia tropicalis Dall.

Plate XXVI. Figs. 8 c, 8 d.

Hanleyia tropicalis Dall, Bull. M. C. Z., IX. p. 53, 1881.

Habitat. Sand Key, in 128 fms.

No new information or specimens have come to hand since this elegant species was described.

Family ISCHNOCHITONIDÆ.

Genus **ISCHNOCHITON** (Gray) Carpenter.

Section STENOPLAX Carpenter.

Ischnochiton (Stenoplax) limaciformis Sowerby.

Chiton limaciformis Sowerby, P. Z. S. 1832, p. 26. Reeve, Conch. Icon. *Chiton*, pl. viii. figs. 42 a-b, 1847.

Chiton productus Reeve, Conch. Icon. *Chiton*, pl. xvii. fig. 97, 1847.

Chiton sanguineus Reeve, *loc. cit.*, fig. 98.

Ischnochiton limaciformis Shuttleworth, Berner Mitth., 1853, p. 190.

Ischnochiton multicostatus Dall, Proc. U. S. Nat. Mus., VI. p. 337, 1883, not of C. B. Adams.

Chiton (*Stenoplax*) *limaciformis* (Cpr.) Mörch, Poulsen, Cat. West Indian Shells, p. 14, 1878.

Habitat. Station 10, in 37 fms., lat. 24° 44′ N. and lon. 83° 26′ W., in the southeastern part of the Gulf of Mexico. Also Key West and other Florida Keys, under stones and among corallines at low water, abundant, Hemphill. Dry Tortugas, Dr. E. Palmer. St. Vincent, West Indies, Guilding. Antilles, various collectors.

This species is also common to West America and Japan, the forms occurring in these regions having hardly a varietal difference from each other. It is the largest Ischnoid Chiton of the Antillean region. *Ischnoplax multicostatus* C. B. Adams agrees in general form, but differs in detail, especially in the armature of the girdle, and belongs in a different section of the genus. *Chiton* *sanguineus* Reeve is a mere color variety of *limaciformis*, but has generally been referred to as a synonym of *C. purpurascens* C. B. Adams, which from authentic specimens is a totally distinct species from *limaciformis.*

Of the *Lophyridæ* and *Acanthopleuridæ* there are no representatives in the Blake Collection.

Super-Family OPSICHITONIA.

This group contains those forms in which the anterior and posterior valves are differently articulated, and the posterior plate is usually abnormal, or with a slit or sinus behind. It comprises, for the present, the *Schizochitonidæ*, *Placophoridæ*, *Mopaliidæ*, *Amiculidæ*, and *Cryptoplacidæ*, corresponding to divisions E to I of the paper on the Genera of Chitons previously alluded to. No fossil forms are known, previous to the Pliocene, for this division of the *Chitonacea.*

FAMILY MOPALIIDÆ.

Genus NOTOPLAX H. ADAMS.

Notoplax Adams, P. Z. S. 1861, p. 403. Type, *N. speciosa* Ad. (Tasmania).

Notoplax floridanus n. s.

Surface of valves entirely covered except a small rounded point at the mucro of the anterior valve and a linear space extending forward from the mucro of the others. The exposed parts are whitish and smooth, or transversely finely striate. They are more conspicuous in dry than in fresh or spirit specimens. The exposed part occupies just about the space which the median suture does in the valves of *Schizoplax.* The covered parts of the valves are whitish clouded with pink. The valves as a whole are wider than long, rectangular, with a very shallow and narrow sinus, except the anterior one are keeled in the median line, overlap each other about half their length, and the two central ones are a little narrower than the others. The valves have about one third the total width of the fresh animal, but about half in the dry specimens. The anterior valve has five notches, the others two each. The mucro of the tail valve is not very prominent, but a little way behind it the immersed portion falls abruptly so that the posterior slope is nearly vertical and the form blunt and high. The part of the tail plate between the notches is not serrate as in *N. speciosa*, but slightly radiately striate, and the sinus is very narrow, shallow, and almost obsolete.

The girdle resembles that of *Katharina* when fresh, being smooth, of a black or brown color with the texture of a moist prune above; below whitish, fleshy, a border of extremely minute spines at the margin. When dry there is a granular irregularity to the surface, as if there were little irregular grains in the substance of the girdle. There are five very small pores about the anterior plate, and a pair at each suture between the valves. There are no pores around the tail plate. The pores are very small in the fresh, and invisible or nearly so in the dry specimen; they are filled with fine glassy spiculæ, which, in the specimens I have seen, do not rise above the surface, but have probably been worn off. The gills extend forward half-way to the head. The muzzle is surrounded by a crumpled veil. The anus is on a papilla. I have seen no spicules on the upper surface outside of the pores. The largest specimen I have seen in alcohol measures 24.0 mm. long, by 13.0 mm. wide.

Habitat. Key West and Key Largo, Hemphill, on the reefs near low water. Dry Tortugas, Dr. E. Palmer. Cape Florida, Wurdeman (in Mus. Comp. Zoölogy).

This remarkable species attracts the attention at once by its dark glistening girdle, and long line of white streaks on its median line, like exclamation points without the dots (ǀ). With the exception of *Chlamydochiton*, less of the valves is exposed than in any species which has them exposed at all. A specimen from which the valves had been dissolved by the acidity of the alcohol was found by Dr. Carpenter in the Museum of Comparative Zoology, and doubtfully referred by him to *Microplax*. But we now know *Microplax* to be a Leptoid, without slits, holding to *Leptochiton* much such a relation as *Notoplax* does to *Acanthochiton*.

The original type of *Notoplax* has the surface of the girdle leathery, the valves are wholly separated from each other by bridges of tissue, and there is nothing said of sutural pores. The exposed part of the valves is larger and wider, with imbricated sculpture. The slits begin as shallow furrows, which are arched over higher up, and form tubes extending to the mucro, visible outside as raised ridges. The valves in this species (*N. speciosa*) are wider and shorter than in *N. floridana* and also farther apart, though they probably overlap a little below the surface. The space in the insertion plate between the two slits in the tail plate is longitudinally strongly grooved, and has a serrated edge. The present species has no serration, no tubular passages to the slits, and the valves are contiguous. It forms a passage from *Notoplax* toward *Stectoplax* (*porrectus* Cpr.) in these particulars, and agrees with it in having sutural pores. On the other hand, *Stectoplax* has the girdle covered with countless minute glassy spines, the sinus is very wide, rounded, and deep, and the slits are thrown forward to a very much greater extent at their distal ends. The anterior and posterior laminæ of insertion are strongly striated in *Stectoplax*, and the sutural pores are conspicuous.

It will be seen from this comparison of characters that this Florida shell is intermediate in its characters. As a wider knowledge of the group may render it necessary to consolidate *Stectoplax* with *Notoplax* under a more comprehensive diagnosis of the genus, and the latter is the older name, I prefer to leave this species in *Notoplax*, though not typical in the characters it exhibits. Its place in the general grouping would be between *Katharina* and the Acanthochitons. The Mopaloid posterior sinus of the tail plate is practically obsolete.

CLASS SCAPHOPODA.

Order SOLENOCONCHIA.

FAMILY DENTALIIDÆ.

Genus DENTALIUM LINNÉ.

The species to be considered may be conveniently divided into smooth species, delicately striated species, strongly sculptured species, laterally compressed species, and dorsally compressed species.

I am inclined to believe that the differences in the soft parts reported in regard to various Scaphopods will be found to be more or less connected by intermediate forms when more species have been examined. To some extent the differences will prove to be due to the point of view of the observer. Differences in the notch or slits at the posterior orifice are often due to erosion or pathologic causes.

An annelid, *Pomatoceras*, simulates some forms of *Dentalium* or *Cadulus*. Other worms adopt the dead shells as a residence, and grow to fit them exactly. A very pretty hermit crab, not asymmetrical like his brethren who dwell in Gastropod shells, makes his home in the dead abyssal *Dentalia*, or in the shells of *Cuvieria*. The large claw is modified to fit the aperture of the shell exactly, like an operculum. Though the shells are white and opaque, and the species is dredged at great depths, the crab is prettily colored with pink and yellow, and has large well pigmented eyes.

A. *Shells circular in section.*

a. *Shells smooth and polished.*

Dentalium agile M. SARS.

Dentalium agile M. Sars, Bull. M. C. Z., IX. p. 37, 1881.
Antalis agilis G. O. Sars, Moll. Reg. Arct. Norv., p. 102, t. xx. fig. 9, 1878.
Dentalium entalis Linné var. *agile* Watson, Chall. Gastr., p. 6, 1885.

Habitat. Station 100, off Morro Light, Havana, in 400 fms.

Most of the specimens originally referred to this species appear on more thorough study, and after comparison with typical specimens of *agile*, to be imperfect or young specimens of *D. perlongum*. A single undoubted specimen of *agile* was, however, taken as above. The original *agile* is very likely connected with some other nominal species, as suggested by Mr. Watson, but I have not had time to make a careful study of the question.

Dentalium perlongum Dall.

Plate XXVII. Fig. 6.

Dentalium perlongum Dall, Bull. M. C. Z., IX. p. 36, July, 1881; Ibid., V., No. 6, p. 61, 1878; Agassiz, Three Cruises of the Blake, II. p. 67, fig. 284, 1888.

Habitat. Station 41, in 860 fms. Station 46, in 888 fms. Yucatan Strait, in 640 fms. Station 33, lat. 24° 1′ N., lon. 88° 58′ W., in 1568 fms. Station 32, in 804 fms. Station 43, in 339 fms. Stations 162 and 163, off Guadelupe, in 734–769 fms., mud and sand, temperature 40°.0. Stations 226 and 228, off St. Vincent, in 424–785 fms., sand, temperature 39°.5 to 42°.5. Stations 235 and 236, off Bequia, in 1507 and 1591 fms., ooze, temperature 39°.0. Station 244, off Grenada, in 792 fms., ooze, temperature 39°.0. Also at U. S. Fish Commission Station 2117, off Cape Hatteras, N. C., in 683 fms., yellow mud, temperature 40°.0, and Stations 2383, 2384, and 2398, in 227–1191 fms., mud, temperature 39°.6 to 48°.6, between the delta of the Mississippi and Cedar Keys, Florida.

This fine species has been carefully compared with all those from deep water in the Jeffreys collection, and seems fully distinct from any of them. Mr. Watson observes that the young resembles *D. longistrorsum* Sowerby in texture and general appearance, but is straight; *D. acutissimum* Watson is stouter and more curved.

Dentalium filum Sowerby.

Dentalium filum Sowerby, Thes. Conch., p. 99, pl. ccxxv. fig. 45, 1866. Jeffreys, P. Z. S. 1882, p. 660.

D. gracile Jeffreys, Ann Mag. Nat. Hist., July, 1870, not of Meek.

A shell agreeing with the specimens named *D. filum* by Dr. Jeffreys in his collection was dredged at Fish Commission Stations 2592, 2595, 2596, 2601, 2602, and 2614, off the coast of North Carolina, in 17 to 124 fms., sand. He quotes it from the N. E. Atlantic and the Mediterranean, in 20–1093 fms., and also from the Italian Pliocene Tertiary beds.

Dentalium callipeplum n. s.

Plate XXVII. Fig. 12 b.

Shell ivory white to pale salmon color, glistening, elegantly arched, rapidly increasing; sculpture of faint girdling incremental lines, and toward the tip faint longitudinal scratches, hardly discernible; section circular, the lower edge projecting a little in the adult aperture; tip entire, circular in the youngest, but in the adult with a wide very shallow notch on the concave side. Anterior diameter, 5.0; posterior diameter, 0.5; lon. of shell, 61.5; height of arch above the chord, 10.0 mm.

Habitat. Station 128, near Santa Cruz, in 180 fms. ooze, temperature 60°.0 ; Station 143, off Saba Bank, a fragment, in 150 fms. ; Station 167, off Guadelupe, in 175 fms., sand, temperature 55° ; Station 220, off Santa Lucia, in 116 fms., hard bottom, temperature 58°.5 ; Station 262, off Grenada, in 92 fms., sand, temperature 62°. Also at U. S. Fish Commission Stations 2314, off South Carolina, in 159 fms., sand, and 2400, in the Gulf of Mexico, in 169 fms., mud, temperature 57°.5 F.

This elegant species has also been received from the coast of Honduras and from Samana Bay, St. Domingo.

Its nearest relative is *D. rubescens* Deshayes, which is less curved in front and more curved near the tip, is smaller, deeper colored, and has a very long narrow posterior slit, when perfect, quite different from that of *callipeplum.*

The specimen figured is young ; better specimens, from which the description was drawn up, were dredged by the Fish Commission. The striation on the tip is so faint as to be very difficult to see, while the surface is so brilliant as not easily to be scrutinized.

Dentalium matara n. s.

Shell slender, salmon-colored, whiter toward the aperture, glistening, the lines of growth hardly perceptible in fresh specimens, other sculpture none; very slightly arched ; aperture circular, very little oblique ; anal orifice higher than wide, slightly notched below and above, with a short wide notch, but on the convex side this is prolonged by a rather wide slit, about 1.0 mm. long. Anterior diameter, 2.75 ; posterior diameter, 0.6 ; length of shell, 41.0 ; height of arch above the chord, 3.75 mm.

Habitat. U. S. Fish Commission Stations 2608 and 2611, off Cape Lookout, N. C., in 22 to 31 fms., sand, temperature 74° to 79°, and Stations 2402 and 2409, in the Gulf of Mexico, in 26 and 111 fms., sand and mud. Also at Samana Bay, Santo Domingo, in 16 fms. mud, Couthouy, in 1854.

This shell is colored like *D. rubescens*, but has a shorter and very different notch, is slimmer, straighter, and has a proportionally larger posterior end when perfect. It is less conical, less arched, and smaller than *D. callipeplum*, which it resembles in brilliancy. It entirely wants the fine posterior striation of *D. leptum* Bush, which is still more slender.

The tube or sheath, which is often seen protruding from the posterior end of Dentalia, is a pathological production, due to the truncation of the tip, which is partially repaired to protect the anal extreme of the animal by the formation of this thin tube. It may occur in any species, but is more marked in thick shells. It has been made the basis of a genus or subgenus, but I doubt if the formation is ever normal and regular in any species; it certainly is not in any specimen I have been able to examine. It is probably confined to such species as do not normally possess a slit or notch in any part of the circumference of the anal aperture.

b. *Shell striated.*

Dentalium leptum Bush.

Dentalium leptum Bush, Trans. Conn. Acad., VI. p. 470, pl. xlv. figs. 18, 18 a, 1885; Rep. U. S. Fish Commission for 1883, p. 85, 1885.

This beautiful and distinct species is reported from the vicinity of Cape Hatteras, N. C., to Charlotte Harbor, Florida, in 2 to 50 fms., sand or mud. It is readily recognized by its orange tint and slender form, delicately and closely striated near the tip.

Dentalium antillarum Orbigny.

Dentalium antillarum Orb., Moll. Cuba, II. p. 202, pl. xxv. figs. 10–13, 1842. Dall, Bull. M. C. Z., IX. p. 37, 1881.

Habitat. Station 20, in 220 fms.; Barbados, in 100 fms.; Yucatan Strait, in 640 fms.; Station 44, in 539 fms.; Station 19, in 310 fms.; Station 43, in 339 fms.; Station 33, in 1568 fms.; off Cape San Antonio, in 1002 fms.; off Havana, in 80 to 400 fms., Sigsbee; Station 136, near Santa Cruz, in 508 fms., ooze, temperature 42°.5; Station 176, off Dominica, in 391 fms., ooze, temperature 43°.5; Station 211, off Martinique, in 357 fms., sand; Station 230, near St. Vincent, in 464 fms., temperature 41°.5; Station 264, off Grenada, in 416 fms., ooze, temperature 42°.5; Stations 272, 282, and 300, near Barbados, in 76 to 154 fms. sand, temperature 56° to 65°. Also by the U. S. Fish Commission at Station 2355, near the Arrowsmith Bank, Yucatan, in 400 fms., ooze; and at Station 2616, twenty-five miles E. S. E. from Cape Fear, N. C., in 17 fms., sand. Also by Dr. W. H. Rush, U. S. N., off Cape Hatteras, in 300 fms., green mud.

This well marked species is uniformly finely grooved from the tip to the anterior part, the interspaces being rounded, subequal, and thread-like, growing slightly finer anteriorly. The section is circular, the notch is on the convex side, shallow and wide, often decollate. I believe its range extends north to New England, and possibly to Nova Scotia, in deep water, judging by specimens so labelled in the National Museum.

Dentalium calamus n. s.

Shell very slender, slightly arched, white, translucent, the soft parts showing through the shell; finely longitudinally grooved, the grooves uniform, the interspaces flat and slightly wider anteriorly; aperture hardly oblique, anal end apparently trimmed off obliquely for a short distance on the convex side, glandiform, phallic, vertically narrowly slit, the slit longer on the convex side, the "glans"-like portion smooth, polished, usually with a little ledge around it. Lon. of shell, 19.5; height of arch from chord, 2.25; diameter of aperture, 1.25; of anal end behind the "glans," 0.8 mm. Grooves in the middle part of the shell about sixteen to the millimeter of circumference.

Habitat. Turtle Harbor, Florida. in 4 fms., Dr. W. H. Rush, U. S. N.

This very elegant and delicate species is not like any other on the coast. Though much smaller and more cylindrical, it has somewhat the general appearance of the last species, but when examined, instead of the sculpture being rounded threads, it is seen to be of sharp fine incised lines with flat smooth interspaces.

Dentalium taphrium n. s.

Shell short, stoutish, slightly curved, pale apple-green, which is so alternated in ill-defined zones of translucency and opacity as to give on a fresh specimen the effect of the silk known as *moire antique*, though the sculpture is not modified in these zones; sculpture of very fine sharp slightly elevated incremental lines, visible only in the interspaces between the longitudinal threads; the latter are even, squarish, rather flattened threads, with subequal channelled interspaces, about six threads to the millimeter of circumference; close to the aperture they become faint, and posteriorly every alternate thread is weaker until it disappears. Both orifices are circular, the anal one has the upper, and to a less degree the lower edge gently concavely waved, but without a slit. Generally this end is decollate and circular. Lon. of shell, 17.0; height of arch from chord, 2.4; diameter of aperture, 2.12; of anal orifice, 0.5 mm.

Habitat. Off the Carolina coast, in 22 to 52 fms., sand, temperature 67° to 78°, at U. S. Fish Commission Stations 2598, 2608, and 2612. Station 2405, in the Gulf of Mexico between the Mississippi delta and Cedar Keys, Florida, in 30 fms., sand.

A couple of specimens were obtained, dead and white, in 182 fms., coral sand, off Havana, Cuba, by the U. S. Fish Commission. These, though decollate behind, were about nine millimeters longer anteriorly than any of the more northern specimens, without gaining much in diameter. The added part was almost destitute of sculpture.

Dentalium candidum JEFFREYS.

Dentalium candidum Jeffreys, Ann. Mag. Nat. Hist., p. 153, 1877; P. Z. S. 1882, p. 658, pl. xlix. fig. 2.
Dentalium solidum Verrill, Trans. Conn. Acad., VI. p. 215, pl. xliv. fig. 16, 1884.

Habitat. Northern Atlantic, Jeffreys, 410 to 1750 fms. N. E. America, Verrill, southward to the Carolina coast, in 843 to 1309 fms.

This is a cold-water species not obtained by the Blake. Though one would not anticipate it from the figure, (which is made from a very perfect young specimen,) an inspection of Dr. Jeffreys's types shows that his species is identical with that of Prof. Verrill.

Under favorable circumstances this species may be of a most brilliant milk-white, but nearly all the specimens are dull ashy gray in color, even when living and in perfect order. I suppose the white ones are those which happen to live in pure sand, while the ordinary form comes from mud or ooze.

Dentalium sericatum Dall.

Plate XXVI. Fig. 1.

Dentalium sericatum Dall, Bull. M. C. Z., IX. p. 37, 1881.

Habitat. Yucatan Strait, in 640 fms.

This species is more acute than *D. taphrium* of the same size, and the *moire antique* effect is of a much more prominent and zigzag pattern. In *D. taphrium* the sculpture is also coarser. A somewhat similar effect is observable on the younger portion of *D. aculeatum* Sowerby, which is otherwise very different. The Indo-Pacific *D. nebulosum* Deshayes also exhibits it. The sculpture is entirely independent of these differences of opacity, which at first one finds it difficult to realize.

Dentalium carduus n. s.

Plate XXVII. Fig. 3.

Shell pure white, sometimes attaining an ashy or rusty tinge from extraneous matter, elongated, slightly curved, and with a rasp-like surface for about half its adult length; longitudinal sculpture of very numerous fine sharp raised threads with somewhat wider interspaces, in which intercalary threads from time to time arise; transverse sculpture of fine sharp elevated lamellæ, which cross the threads and become almost spinulose on the intersections; these can be felt, but are almost too fine to be clearly seen with the naked eye; in the perfectly adult shell, this sculpture becomes, through senility or wear, less sharp on the last half of the shell; though both sorts of ridges persist, they are thicker and more rounded; shell not very thick; aperture circular, very little oblique ; anal orifice small, with a short wide slit on the convex side, and no notch or wave on the other. Lon. of completely adult shell, 87.0 ; height of arch from chord, 7.0; diameter of aperture, 7.0; of anal orifice, 0.7 mm.

Habitat. Station 220, near Santa Lucia, in 116 fms., hard bottom, temperature 58°.0. Station 246, in 154 fms., ooze, near Grenada, temperature 56°. Also by the U. S. Fish Commission, in 338 fms., sand, at Station 2655, on the Little Bahama Bank, temperature 47°.5.

The specimen figured is only 16 mm. long, but shows sufficiently the characters of the form and sculpture. Better specimens were afterward found in some of the Fish Commission dredgings, from which the above description is drawn. The peculiar sharpness felt by drawing the shell gently between the finger and thumb is very recognizable, and under the glass the sculpture is very beautiful.

c. *Species strongly sculptured.*

Dentalium disparile Orbigny.

Dentalium disparile Dall, Bull. M. C. Z., IX. p. 37, 1881 (ex parte). Orbigny, Moll. Cuba, II. p. 202, pl. xxv. figs. 14–17, 1842.

Habitat. Coast of Florida, in 2–10 fms. Cuba, Orbigny. Bahamas, Rawson. Samana Bay, St. Domingo, Couthouy. Barbados 100 fms., Blake Expedition.

This species has no notch or slit when perfect; when truncate it repairs damages by projecting a small tube from the broken end. It recalls *D. panormitanum* Jeffreys, but is smaller, less uniform in sculpture, and has no notch.

Dentalium ceratum Dall.

Plate XXVI. Fig. 5. Plate XXVII. Fig. 2.

Dentalium ceratum Dall, Bull. M. C. Z., IX. p. 38, 1881.

Habitat. West Florida, Pourtalès, 50 fms. Station 2, in 805 fms. Sigsbee, off Havana, in 119–177 fms. Station 36, in 84 fms. Station 45, in 101 fms. Station 101, off Morro Light, Havana, in 175 to 250 fms. Station 140, off Virgin Gorda, dead, in 1097 fms. Station 208, in 213 fms., off Martinique. Barbados, 100 fms. Station 226, off St. Vincent, in 424 fms., sand. Stations 272, in 76 fms., sand; 290, in 73 fms., sand; and 299, in 140 fms., coral, near Barbados. Also by the U. S. Fish Commission, south of Cuba, at Station 2135, in 250 fms., coral. Temperatures ranging from 42°.5 to 71°.0, and averaging 53°.1 F.

This species also recalls *D. panormitanum*, but is always more slender, usually shorter, has a yellow waxen instead of an apricot tint, and the raised sculpture is finer and more uniform. *D. ceratum* has a shallow wave above and below at the anal end, while *D. panormitanum* has a true, though short slit.

Dentalium Gouldii n. s.

Plate XXVI. Fig. 4.

Shell elongated, slender, slightly arched, vitreous, anteriorly whitish, behind with a yellowish or pale greenish tinge; surface polished, with fine microscopic longitudinal striæ, over a large part of the surface; in well developed specimens the shell is hexagonal and six-sided, with the sides impressed so that the ribs stand out like marginating rods; as the shell grows older, the angles become less marked, although generally quite perceptible at the aperture; the lines of growth are visible as extremely fine engraved striæ; in another mutation of the species (which served the draughtsman for Fig. 4), there are longitudinal threads between those forming the angles, and which obscure the angularity especially in front until the shell is examined from behind "end on," when it will be perceptible; this form is straighter than the type. The aperture is not at all oblique. There is a wide rather short notch, perhaps due to erosion, at the convex side of the anal orifice in the shell figured. Typical form shows no notch when perfect, and measures 30.0 mm. long, height of the arch 3.5 mm., aperture 3.0 and anal end 0.6 mm. in diameter. The variety *obscurum* is 28.0 mm. long, aperture 2.0 and anal end 0.5 mm. in diameter.

Habitat. Off Havana, in 127 fms. Variety at Station 299, in 140 fms., coral, near Barbados, temperature 56°.5. Also (the typical form) at U. S. Fish Commission Station 2145, in 25 fms., mud, near Aspinwall. Also in 12 fms., twelve miles east from Fryingpan Shoals, South Carolina, Dr. W. H. Rush, U. S. N. Also Barbados, *fide* H. Cuming.

This shell was confounded with *D. hexagonum* Gould, a large Chinese species of similar form, by Sowerby and Reeve. The typical form of *D. Gouldii* is longer, more slender, and less curved than the figures of Reeve and Sowerby, which represent a young *D. hexagonum.* It is just possible that the supposed variety may prove distinct, in which case it may be called *D. obscurum;* but I inclined at present to believe it to be nothing more than a variety. The ordinary form is what has been called *hexagonum* by West Indian collectors for many years, but the rounding off of the angles as the shell becomes adult is not paralleled in the Chinese species, which is much larger, and has a reddish dull surface, like pale terra-cotta.

Dentalium ceras WATSON.

Dentalium ceras Watson, Linn. Soc. Journ., XIV. p. 510, April, 1879. Dall, Bull. M. C. Z., IX. p. 37, 1881. Watson, Chall. Gastr., p. 3, pl. i. fig. 4, 1885.

Habitat. Station 33, Gulf of Mexico, in 1568 fms. Station 193, off Martinique, in 169 fms., sand. Temperatures 40°.5 and 51°. Pacific Ocean, Challenger Expedition.

By a *lapsus* in the text of the Bulletin one of Watson's specimens was stated to come from the "Atlantic" west of Valparaiso, instead of the *Pacific*, as is evident from the context. A comparison made by the kind assistance of Mr. Watson confirms the identification of the Blake shell, which it thus seems is really found in both oceans. It is close to *D. capillosum*, but is shorter, increases more rapidly, and has a wider anterior end. The Blake specimens were both dead, the Challenger specimen living, when taken.

Dentalium capillosum JEFFREYS.

Dentalium capillosum Jeffreys, Ann. Mag. Nat. Hist., p. 153, Feb., 1877; P. Z. S. 1882, p. 658, pl. xlix. fig. 1.

Habitat. Whole North Atlantic, Challenger, Valorous, and Travailleur Expeditions. Off Havana, Sigsbee, in 119 fms. Station 193, off Martinique, in 169 fms. Station 220, near Santa Lucia, in 116 fms. Barbados, Hassler Expedition, in 100 fms.

All the specimens were dead or fragmentary, and most of them belong to the variety *paucicostatum* Watson. In examining the specimens named *D. capillosum* in the Jeffreys collection, I find several of them which he regarded as the young to be of a more slender and much smaller species, which probably never attains a large size, though sculptured like *D. capillosum.* The specimen figured in the P. Z. S. above cited is only about one third the size of an adult.

Dentalium laqueatum Verrill.

Plate XXVII. Fig. 1.

Dentalium laqueatum Verrill, Trans. Conn. Acad., VI. p. 431, pl. 44, fig. 18, 1885.

Habitat. Off the eastern coast of the United States, in 60 to 200 fms., U. S. Fish Commission, from near Cape Hatteras, North Carolina, to the vicinity of Cape Florida, abundant; temperature ranging from 58° to 75°. Blake Expedition, at Station 9, Gulf of Mexico, in 127 fms. Off Sombrero, living, in 54 fms. Off Havana, in 127 to 177 fms., Sigsbee. Station 132, off Santa Cruz, in 115 fms., hard bottom. Station 177, off Dominica, in 118 fms., sand. Station 240, near the Grenadines, in 164 fms., coral. Station 246, off Grenada, in 154 fms., ooze. Stations 290, 293, and 296, near Barbados, in 73–84 fms. Temperature range, from 52° to 70°.75 F.

This very fine species reaches the length of 55 mm. The very young have generally a very slight wave on the convex side of the anal aperture; in the adults this aperture is sometimes circular and unslit; sometimes there is a narrow slit 5.0 mm. long. The very young have the transverse sculpture most prominent (aside from the strong ribs which range from nine to eleven), the adolescent part the longitudinal striæ, while near the lip of the adult both are obsolete. I am disposed to think the species does not reach more than 200 fms.

It recalls *D. octagonum* Lamarck, but the secondary striæ in that species when present are much coarser, the ribs fewer, and the taper at the posterior end much more abrupt.

B. *Species vertically compressed.*

Dentalium compressum Watson.

Dentalium compressum Watson, Lin. Soc. Journ., XIV. p. 516, April, 1879. Dall, Bull. M. C. Z., IX. p. 38, 1881. Watson, Chall. Gastr., p. 9, pl. i. fig. 9, 1885.

Habitat. Station 43, in 339 fms. Off Cape San Antonio, in 413 fms. Station 2, Gulf of Mexico, in 800 fms. Station 226, near St. Vincent, in 424 fms., sand, temperature 42°.5. Culebra, St. Thomas, in 300 fms., Challenger.

Also in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Florida, at Station 2402, in 111 fms., mud, by the U. S. Fish Commission.

The posterior half of well preserved specimens is coarsely obscurely striated.

Dentalium ophiodon Dall.

Plate XXVI. Fig. 9.

Dentalium ophiodon Dall, Bull. M. C. Z., IX. p. 38, 1881.

Habitat. Station 19, in 310 fms. Station 20, in 220 fms. Station 21, in 287 fms. Barbados, Hassler Expedition, in 100 fms.

This is a more slender, smaller, and more delicately striated species than the preceding.

C. *Shell laterally compressed.*

Dentalium callithrix n. s.

Plate XXVII. Fig. 10.

Shell white, moderately curved, laterally slightly compressed ; sculpture of about nine primary longitudinal ridges, angulating the section, with between them toward the middle of the shell three to five secondary smaller rounded threads, crossed by moderately strong lines of growth ; the primaries are strongest posteriorly, they become fainter in front and all the longitudinal sculpture nearly uniform near the aperture in the adult ; aperture oblique, rounded oval, the lower lip in advance, margin thin ; anal orifice circular, simple in the young, without notches or slit ; adults usually show a short broadish slit on the concave side, or are irregularly eroded ; the extreme tip in the young is more curved than the body of the shell, and quite acute. Lon. of shell, 25.0; height of arch above chord, 5.0 ; vertical diameter of aperture, 3.75; transverse ditto, 2.75 ; diameter of anal end in young, 0.25 ; in figured specimen (eroded), 1.0 mm. The shell may attain a length of 43.0 mm.

Habitat. Yucatan Strait, 640 fms. Gulf of Mexico, Station 20, in 220 fms. Station 41, in 860 fms. Station 162, near Guadelupe, in 769 fms., sand, temperature 40°.0. Station 221, off Santa Lucia, in 423 fms., ooze, temperature 43°.0. Station 236, off Bequia, in 1591 fms., ooze, temperature, 39°.0. Station 248, in 161 fms., ooze, off Grenada, temperature 53°.5. Also at U. S. Fish Commission Station 2678, in 731 fms., ooze, off Cape Fear, North Carolina, temperature 38°.7, and Station 2383, in the Gulf of Mexico, between the delta of the Mississippi and Cedar Keys, Florida, in 1181 fms., mud, temperature 40°.0 F.

This is a very characteristic species, in which the longitudinal sculpture, and even the shell, are often somewhat spirally twisted as much as one eighth of the circumference.

Dentalium ensiculus Jeffreys.

Plate XXVII. Fig. 12.

Dentalium ensiculus Jeffreys, Ann. Mag. Nat. Hist., p. 154, Feb., 1877; P. Z. S. 1882, p. 660, pl. xlix. fig. 4. Watson, Chall. Gastr., p. 12, pl. ii. fig. 2, 1885.
Dentalium didymum Watson, Journ. Linn. Soc., XIV. p. 517, 1879; Chall. Gastr., p. 10, pl. i. fig. 11, 1885.
Dentalium Sigsbeanum Dall, Bull. M. C. Z., IX. p. 38, 1881.

Habitat. Yucatan Strait, 640 fms. Station 230, near St. Vincent, in 464 fms., temperature 41°.5. Station 288, off Barbados, in 399 fms., hard bottom, temperature 44°.5. Also, by Dr. W. H. Rush, U. S. N., in 1060 fms., Yucatan Strait, and off Havana, in 1024 fms., mud. North Atlantic, Portugal, West of Ireland, Bay of Biscay, off Sombrero and Culebra Islands, West Indies, in 390 to 1785 fms., Jeffreys and Watson.

A comparison of a full series renders the above consolidation evidently necessary.

Genus CADULUS Philippi.

Cadulus Philippi, En. Moll. Siciliæ, II. p. 208, pl. xxvii. fig. 21, 1844.

The subdivisions of this genus are somewhat uncertain, owing to the prevailing ignorance of the characters of the soft parts, and of the value for systematic purposes of these differences where they are known. The type of the genus, *C. ovulum* Philippi, is nearly related to *C. obesus* Dall and *C. gibbus* Jeffreys, but from these forms to the long and *Dentalium*-like forms, called *Siphonodentalium* by Sars, there is conchologically an insensible gradation. There is little doubt that very different animals in some cases form these very similar shells, but we are not yet in a position to make a final classification of them.

Cadulus quadridentatus Dall.

Plate XXVII. Fig. 5.

Siphonodentalium quadridentatum Dall, Bull. M. C. Z., IX. p. 36, July, 1881.
? *Cadulus incisus* Bush, Trans. Conn. Acad., VI. p. 471, pl. xlv. fig. 20, June, 1885.

Habitat. Fernando Noroñha, 7–25 fms. West coast of Florida, 30 fms. Northward along the coast to Cape Hatteras, abundantly, in 12–50 fms., sand.

I have not seen an author's specimen of Miss Bush's species, but the species described as above by me is quite abundant on the Carolina coast, and agrees well with her description and figure. Most of the specimens have a slightly dull silky look, with a slight yellowish tendency, as compared with the other species, but this is not absolutely invariable, and may be due perhaps to the action of the gastric juices of a fish upon specimens afterward disgorged. There is much variation in the depth of the nicks at the posterior margin, and rarely there are six instead of four. Some are usually deeper than others, and they are seldom as square as in the one figured.

Cadulus æqualis Dall.

Plate XXVII. Fig. 9.

Cadulus æqualis Dall, Bull. M. C. Z., IX. p. 34, 1881.

Habitat. Station 43, in 339 fms., near Tortugas.

This fine species is the least swollen of any of the forms from this region, and only *C. cylindratus* Jeffreys, exceeds it in this particular. Its nearest relative is *C. spectabilis* Verrill, which is larger, less cylindrical, more curved, and more attenuated behind.

Cadulus spectabilis Verrill.

C. spectabilis Verrill, Trans. Conn. Acad., VI. p. 432, pl. xliv. fig. 19, 1885.

Habitat. Station 230, near St. Vincent, in 464 fms., sand, temperature 41°.5. Southeast of George's Bank, Massachusetts coast, in 1400–1800 fms., U. S. Fish Commission.

The single specimen from St. Vincent is of a more even ivory white, and rather less attenuated posteriorly, than the specimens from New England; otherwise it seems to agree fairly well with them.

Cadulus Watsoni Dall.

Plate XXVII. Fig. 12 a.

Cadulus Watsoni Dall, Bull. M. C. Z., IX. p. 34, 1881.

Habitat. Yucatan Strait, near Cape San Antonio, in 413 and 1002 fms. Also off Old Providence, in 382 fms., ooze, temperature 46°.0, at U. S. Fish Commission Station 2150.

Cadulus poculum Dall.

Shell about the size of *C. Watsoni*, but more curved; the swollen equator quite near the mouth, and the part of the shell in front of it sharply compressed vertically, with the aperture very oblique, like the mouth of a whistle; wider than high; surface polished, smooth; posterior aperture small, circular, not notched, but projecting slightly more at the sides than above or below. Lon. of shell, 13.2; anterior margin over convex side to equator, 4.0; vertical diameter at equator, 2.0; transverse ditto, 2.5; transverse diameter of posterior orifice, 0.63; of anterior ditto, 1.75 mm.

Habitat. Off Cape San Antonio in 640 fms. Station 226, near St. Vincent, in 464 fms., sand, temperature 42°.5 F.

This shell is remarkable for the obliquity of the equator, and of the slope on the convex side from the summit to the anterior margin. In these particulars it is more strongly marked than any other species I have seen. The anterior orifice is nearly circular, but looks upward from its lower lip at about 45°. The equator is opaque white, strongly marked, and contrasted with the translucency of the rest of the shell. Behind it the attenuation is very rapid, and the posterior end unusually small for a *Cadulus* of this size.

Cadulus Jeffreysi MONTEROSATO.

Cadulus Jeffreysi Monterosato, Conch. Medit., p. 10, 1875.
C. subfusiformis Jeffreys, Brit. Conch., V. p. 196, pl. ci. fig. 3, not of M. Sars.
C. diploconus Seguenza, fide Jeffreys.
C. propinquus Verrill, Trans. Conn. Acad., V. p. 558, pl. lviii. figs. 31, 32, not of G. O. Sars.
? *C. Jeffreysi* Verrill, *loc. cit.*, p. 559.

Habitat. Barbados, in 100 fms. Off Martha's Vineyard, at U. S. Fish Commission Station 871.

The specimens have been compared with authentic types of *C. Jeffreysi.*

Cadulus carolinensis BUSH.

Cadulus carolinensis Bush, Trans. Conn. Acad., VI. p. 471, pl. xlv. fig. 19, 1885; Rep. Com. Fisheries for 1883, p. 85, 1885.
Cadulus Olivii Jeffreys, MS., *non* Scacchi.

Habitat. Off the Carolina coast, in 14 to 63 fms., sand, abundantly. U. S. Fish Commission, also at Old Providence, in 382 fms., ooze, temperature 46°.0.

Cadulus (carolinensis var.?) Bushii DALL.

Shell resembling *C. carolinensis*, but somewhat smaller, more abruptly constricted behind the swollen portion, and with the posterior orifice a little smaller. Lon., 6.5; max. diam., 1.25 mm.

Habitat. Barbados, in 100 fms.

In the present uncertainty as to what constitutes a species in this group, or what is the range of specific variation, it is impossible to say whether this form should be regarded as a species, or as a variety of *C. carolinensis* Bush.

Cadulus Agassizii DALL.

Plate XXVII. Fig. 12 c.

Cadulus Agassizii Dall, Bull. M. C. Z., IX. p. 35, 1881.

Habitat. Station 5, in 229 fms.

No more specimens of this species have come to hand. It is very like *C. pandionis* Verrill, but has the anterior aperture less oblique, the equator more marked, the posterior part proportionally shorter and less attenuated. It is also smaller than *C. pandionis.* The latter has about the same range as *C. carolinensis*, but has not been found yet south of Fowey Rocks, Straits of Florida, where it was collected by Dr. W. H. Rush, U. S. N.

Cadulus lunula Dall.

Plate XXVII. Fig. 8.

Cadulus lunula Dall, Bull. M. C. Z., IX. p. 35, 1881.

Habitat. Station 2, in 805 fms. ; Barbados, in 100 fms.

By a typographical error the specific name appeared in the Preliminary Report with a masculine termination. A fragment, apparently of this species, was dredged by the Fish Commission, off Cape Lookout, N. C., in 18 fms.

Cadulus obesus Watson.

Cadulus obesus Watson, Lin. Soc. Journ., XIV. p. 527, April, 1879; Chall. Rep. Gastrop., p. 22, pl. iii. fig. 8, 1885. Dall, Bull. M. C. Z., IX. p. 36, 1881.

Habitat. St. Thomas, Challenger Expedition, 390 fms. Blake Expedition, Station 20, in 220 fms. Only one specimen was obtained.

Cadulus amiantus Dall.

Plate XXVII. Fig. 7.

Cadulus sauridens Dall, Bull. M. C. Z., IX. p. 36, 1881, not of Watson, Lin. Soc. Journ., XIV. p. 525, April, 1879.

Habitat. Station 19, in 310 fms. Off Cape San Antonio, in 1002 fms. Off Cape Florida, in 8 fms., Dr. W. H. Rush, U. S. N.

This species, first identified by me with *C. sauridens* Watson, was submitted to Mr. Watson for examination. He writes: "Compared with *C. sauridens* it is three times as long, mouth not oblique nor regular ; form much more bent, swelling much more pronounced and nearer the anterior end. The transverse contour line is more circular, there being little if any flattening between the convex and concave slopes. It is more like *C. vulpidens* Watson, but is only half the length of that species, and less conical behind the 'equator,' and more conical in front of it. The equator is less angulated than in *C. vulpidens*, and not so near the mouth." The length of *C. amiantus* is 5.75 ; its max. diameter, 1.4 mm. Both orifices are circular and not notched, and the swelling evenly shades off toward the extremities. The specimens obtained off Cape Florida are more slender than the typical form.

Cadulus cucurbita Dall.

Plate XXVII. Fig. 12 d.

Cadulus cucurbita Dall, Bull. M. C. Z., IX. p. 35, 1881.

Habitat. Station 19, in 310 fms.

The single specimen obtained recalls *C. gibbus* Jeffreys, but is very much larger, and differently proportioned.

Cadulus acus n. s.

Plate XXVII. Fig. 11.

Shell small, very slender, slightly curved, variegated with translucent and opaque white rings and encircling bands which become broader toward the anterior extreme ; aperture circular, slightly oblique, the shell behind it rapidly increasing to its point of maximum diameter, from which it very gradually tapers toward the almost acute posterior extremity. Surface smooth, with extremely fine circular grooves or lines, which, under a strong magnifier, are visible over most of the posterior third of the shell with their interspaces, recalling the rings of *Cœcum trachea* on a much more minute scale ; the rings of opaque color sometimes coincide with the sculpture, but not constantly. Lon. of shell, 8.0; diameter of aperture, 0.5 ; max. diam., 0.75 ; post diam., 0.12 mm.

This is perhaps the most slender species known, and was obtained by Captain Couthouy, U. S. N., about 1850, in Samana Bay, Santo Domingo, in thirty fathoms, muddy bottom, where it was abundant. It is introduced here as belonging in the fauna ; the specimens have been in my hands about twenty-five years.

Cadulus gracilis Jeffreys.

Cadulus gracilis Jeffreys (1877), P. Z. S. 1882, p. 664, pl. xlix. fig. 6.

Cadulus gracilis Jeffreys, obtained in 843 fms., off Cape Hatteras, at U. S. Fish Commission Station 2115, was identified by Dr. Jeffreys as his species.

Cadulus minusculus n. s.

A much smaller species of *Cadulus*, perhaps the smallest known, was obtained by the U. S. Fish Commission, off Hatteras, in 63 fms., sand, at Station 2595. It is a little stouter than *C. subfusiformis* Sars, but shorter and more cylindrical. The mouth is decidedly more oblique than in *C. subfusiformis*, and the shell less bent. It is much the form of *C. Jeffreysi* Monterosato, and is just about half as large.

May 14, 1889.

ADDENDA AND CORRIGENDA TO PART I., 1886.

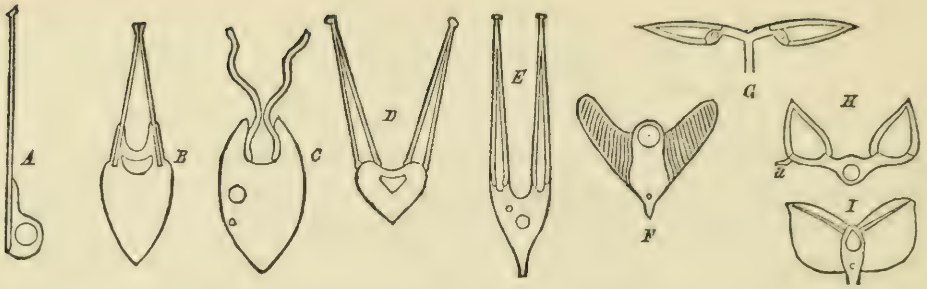
The Structure of the Gill in Amusium Dalli (I. p. 209), **Dimya argentea** (I. p. 228), **and Arca ectocomata** (I. p. 243). — The structure of the gill in Lamellibranchs is of considerable interest, and has been investigated by Peck, Lacaze-Duthiers, Bonnet, Mitsukuri, and others. The subject is very far from exhausted, however, and progress in this direction has been checked, not so much because a majority of the known forms have been investigated, which will not be true for a long time to come, as because later students have assumed that the few which they have examined adequately represent the many which they have not seen. Another difficulty is, that so far no system of nomenclature has been adopted, or even suggested, by which one could designate a particular form of ctenidium when recognized. Dr. Paul Pelseneer therefore deserves credit for attempting a diagrammatic classification in his Report on the Anatomy of Deep Sea Mollusks in the Challenger series.

Unfortunately, when he leaves the regions of research for those of hypothesis, it is at once evident to any one having a wide knowledge of these organs in the Mollusca that his basis is inadequate, especially if the theories be tested by application to mollusks in general. Dr. Pelseneer has recognized neither the multiplicity of form which is exhibited by molluscan breathing organs, nor the inadequacy of our present knowledge as a foundation for such wide generalizations. Consequently his discussion is chiefly valuable as calling attention to the subject, and presenting a preliminary basis for future comparisons.

In order to correct certain observations of my own, if they stood in need of it, and to confirm them if sundry doubts of Dr. Pelseneer's proved ill founded, I reviewed the material discussed in Part I. of this Report.

A section through the ctenidium, at or near the point where it becomes free from attachment to the mantle, gives conclusive evidence of the gill structure at a glance. Putting this in practice, I examined the original specimens referred to at the head of this page, and a variety of other species for purposes of comparison.

Beginning with the simplest form, *Dimya*, I found the original description given by me to be in need of no corrections. The base of the gill consists of a rather large tube, constituting the branchial vein or blood-sinus, with a single series of filaments on one side of it, unconnected except at their base of insertion. Prof. Huxley states that the simplest form of gill consists of "a stem fringed by a double series of filaments" (Inv., p. 408, Am. edition). In



Diagrammatic Sketch of different Forms of the Ctenidia in Mollusks.

The length of the filaments or lamellæ in the first five figures of the diagram is made for convenience disproportionally small.

A. Cross-section of gill of *Dimya*, showing large blood-vessel in the stem, and the position occupied by the filaments upon the stem.

B. Cross-section of the gill in *Amusium Dalli*, the filaments touching but not organically united above.

C. The same of *Arca ectocomata*, showing the tubular filaments planted in a groove, and the asymmetrical position of the blood-vessels.

D. Section of gill in *Arca Noæ*, the filaments organically united.

E. The same for *Janira hemicyclica*.

F. Cross-section of one of the gills of *Pleurotomaria Adansoniana*.

G. Gill in *Cardium* sp.

H. Cross-section of the left pair of gills in *Perna ephippium*; at *a* these are united with the right-hand pair by connective tissue crossing the median line of the animal.

I. Cross-section of the gill in *Nucula*, after Mitsukuri.

Dimya we have the still simpler form of a stem with only a single series of filaments. (See Diagram A.) In *Amusium Dalli* we have a gill of the form described by Prof. Huxley. The stem has two series of filaments, which are organically connected only at their bases, one series attached on each side of the stem with the space between them slightly excavated, and the lumen of the blood-vessel below it of a semilunar shape. (See Diagram B.) The filaments, as in *Dimya*, are adhesive to one another wherever they touch, have hoof-shaped extremities, and are supported by fine chitinous rods, one to each filament. In the ordinary shallow-water Pectens (e. g. *Janira hemicyclica*, see Diagram E) there are on each side of the stem two series of filaments, organically connected by delicate tissue, sustained by rods of chitine, and forming a double series on each side of the stem. These series do not adhere to one another, but the tips of the filaments in *Amusium Dalli* do adhere over the groove by the adhesiveness of their ciliated surfaces, and practically form a single sac, comparable to one of the two series observable in *Janira;* but composed of the elements of which the inner halves of the series in *Janira* are made up, while the respective outer halves are absent in the *Amusium*.

It may of course be claimed that the two series on each side of the gill in D and E are merely the single series of C and B laterally extended, so as to form a flat lamella, instead of a columnar filament, for each process. Indeed, Deshayes's figure of a single lamella of *Arca Noæ* would directly convey this idea. But that is not the impression made upon me by a microscopical examination of the lamellæ. They seem to me, in the specimens I have examined, to consist of two rods, each with a chitinous skeleton or axis, united by a thin transverse tissue, like the paper of a kite between the cords of its periphery. An examination of the stages of development of the gill in some form of *Pecten* or *Arca* will be required to settle the true interpretation.

In *Arca ectocomata* the stem of the gill is large, and the blood-vessels are close to the inner wall as in *Dimya*, instead of being central as in *Janira*, *Amusium*, or *Perna*. The edge of the stem is deeply grooved, and from the opposite sides of this groove extend the gill filaments. On each side they are placed in a single rank with a passageway between their bases, but they curve toward one another at the lips of the groove, and nearly or quite touch. In this manner a sort of half-closed passage extends between them. The filaments, unlike those of the forms above described, are not supported by chitinous rods; they seem to be simple tubes, abundantly ciliated, and in alcohol are contorted in all directions, twisted, and curled. The tips of the filaments are slightly enlarged, but owing to their want of solidity and absence of connection with one another, they appear not to form even as much of a sac as in *Amusium Dalli*, unless the passage between their bases be so regarded. (See Diagram C.) Taking for comparison *Arca Noæ*, we find a proportionally smaller stem, with a double series of chitinous rods on each side; the pairs of each series are connected by delicate tissue only with each other, and these combined groups correspond to the analogous series described in *Janira*. The blood-vessel is central between their bases, which are separated externally by an excavated space. The vein appears subtriangular in section. (See Diagram D.)

In *Perna*, *Chione*, and *Cardium*, the double series are pedunculated; in *Perna* (Diagram H) the vein is central between the peduncles, in *Cardium* it is double (Diagram G), one vein appearing at the base of each sac; in *Chione* it is much the same, but the outer branch of the vein is between the bases of the outer primary lamella and the appendix or secondary lamella; the term lamella in this instance being understood to mean a complete platoon, including a double series of filaments.

Whatever sort of nomenclature be used, it follows from the above interpretation of the facts that the gills of *Arca ectocomata* and *Amusium Dalli* are just half the elements which go to make up the gills in *Arca Noæ* and *Janira hemicyclica;* while in *Dimya* only one quarter as many elements are represented.

In *Nucula* (Diagram I) we have a more specialized gill than in *Dimya* or *Amusium*, though this will not be evident except by careful study. The gill of *Pleurotomaria*, a much higher type of mollusk than *Nucula*, is more simple than any of those above mentioned. It is composed of a cartilaginous adnate stem, with lateral transversely striate lamellæ (see Diagram F), a large and a small blood-vessel. In section it appears much like that of *Nucula* or *Solenomya*, but careful study shows the internal structure of the two to be different. The lamellæ of the Gastropod are destitute of the elaborate framework of chitine found in the Pelecypod ctenidium.

In referring to the insufficiency of characters offered by the specialization of the gill structure for systematic purposes, it was not my intention to deny these characteristics any value. They have a certain value in minor groups, such as families, but, in my opinion, far less for higher groups than that of the nervous system, the relations of the heart and intestine, the radula and the shell, all of which are more fundamental in connection with the molluscan organization. This is hardly the place to enter into a general disquisition on the ctenidia, but it may not be amiss to observe that two chief factors in their position, specialization and development, are the desirability of avoiding the water fouled by effete matter discharged from the intestine, and the economic use of tissue to obtain large aerating surface with the least expenditure of material. These factors necessarily vary with many modifications of the organism which are of little systematic importance, and consequently the specializations of the gill subsequently produced are of no greater systematic value than their inciting causes. The increase of aerating surface is attained in a multiplicity of ways, many of which are most admirable and complicated; but their significance is not great in the assignment of systematic position to the animal which exhibits them.

There can be little doubt that the original form of gill was a simple pinched-up lamella. This, elongated, becomes a filament. Filaments united by suitable tissue, trussed, propped, and stayed by a chitinous skeleton, result in the forms, wonderful in number and complexity, which puzzle the student to describe, and much more to classify them.

But when it is a question as to deriving the greatest benefit from pure water, if required (so to put it) to choose between the retention of the normal ctenidium on the one hand, and the development of new breathing organs elsewhere with a possible obliteration of the original ctenidium on the other, the organism will always give the functional processes great weight. In the *Docoglossa* we have an instance of this. Waiving the question whether the blind deep-water *Abranchiata* (*Lepetidæ*, etc.) are degenerate or primitive forms, it is evident that the *Acmæidæ* are the most typical forms of the whole group. They have a smooth muzzle with an elevated tactile margin, often angulated at its lower corners; a normal ctenidium over the neck; eyes; and a rather primitive dentition. In the *Lepetidæ* there are no eyes; the tactile margin of the muzzle has become prolonged into large tentacles; there are no specialized breathing organs of any sort; the radula is somewhat less primitive, but still has rather generalized characteristics.

In the forms where the effete products of intestine and kidney are discharged over the neck into the same general chamber with the ctenidium, some disadvantage necessarily must result to the animal. In *Scurria* there are attempts to remedy this by adding a more or less complete cordon of plain lamellæ developed in the peripedal commissure between the mantle and the foot. This begins as far as possible from the excretory organs, and is developed last in front. In the *Patellidæ*, the most specialized group of all, containing the largest and most specialized species of *Docoglosas*, we have the tactile muzzle margin and its prolongations gone, the surface is simply papillose without special margin; the eyes are well developed in the larger species; there are traces of an epipodium, and the hereditary ctenidium, which still lingered with *Scurria*, has entirely vanished. The circular cordon performs all its functions. The teeth are more fully specialized, all divisions of the radula being represented in the series. Among the *Rhiphidoglossa* we have an Acmæid gill in *Scutellina*, a totally different form of gill in *Addisonia*, and a pair of symmetrical ctenidia in *Emarginula*, etc.; yet no one can question that these animals all belong to the same great group or order.

In the Petrophilous pulmonates, we have *Siphonaria* with a gill and lung, *Gadinia* with only a lung, and *Onchidium* with a lung and dorsal, possibly branchial, proliferations. In no one of them is there a typical ctenidium developed. These examples illustrate my reasons for considering the breathing organs very mutable structures, and unsuited for use in classification of the higher groups, or as diagnostic characters for important subdivisions of the systems. Dr. Pelseneer criticises Dr. Fischer for using the number of the gill ranks or series as a basis for classification. He elsewhere criticises the writer for upholding the view that these characters are not well adapted for such a purpose. Lastly he adopts a diagrammatic classification for the different forms of ctenidia, with the implication that, presented in the manner he adopts, the ctenidia may be used for classification. It seems to the writer, however, that Dr. Pelseneer has really, though unconsciously, adopted the principle upon which Dr. Fischer based his prior classification, merely adding to and correcting the latter in details. Dr. Pelseneer claims that classification by ctenidia is possible if we take the structure and not the number of the lamellæ. He then proceeds to show how the number may be more correctly counted than formerly, and having done this uses it as a basis for classification. This is quite proper from his standpoint, but proves that his advance beyond his forerunners is less than he supposes.

In 1886, I called attention to the manner in which the stages of development of the breathing organs in *Cuspidaria*, *Cetoconcha*, *Verticordia*, and *Lyonsiella* represent the successive stages of development of the typical ctenidium (Blake Report, Part I., pp. 280, 281, 1886); not by this intending to convey the idea that I believed these groups to be derivative one from another, but only that they represent the steps by which development in a related series would proceed. I believe this view is correct, although, as will be seen later, I regard the gill in *Lyonsiella* as of the ordinary type, while the lamellæ of *Cetoconcha* and *Poromya* are a totally new development, partly consequent on the previous degeneration and obliteration of normal ctenidia in the ancestors of these genera. On the other hand, Dr. Pelseneer would regard the lamellæ in these forms as degenerated remnants of the normal typical gill, for which in these observations, I have reserved the name ctenidium. In another place I have shown the anatomical grounds for the belief that this construction of the facts is erroneous. In any case, the mere attitude of the laminæ of the ctenidium can have but very slight systematic importance.

Amusium pleuronectes (I. p. 209). The form referred to as this species dredged in the Gulf of Mexico, proves by comparison with the Pliocene fossils to be *Amusium Mortoni* Say. In specimens of equal size it can hardly be distinguished from that variety of *Amusium pleuronectes* which has the internal liræ paired, but the *A. Mortoni* grows to a larger size, is then rather more circular and slightly more convex than any of the Oriental forms, and for practical purposes may be regarded as a distinct species.

Pecten phrygium (I. p. 217). See Plate XL., Fig. 1, Part II., where this species is figured, and also in Agassiz, Three Cruises of the Blake, II. p. 72, Fig. 299. A fine flattened pink and white rayed *Pecten*, with 30 internal liræ arranged in pairs and about 15 ribs, was dredged in 124 fathoms, off Cape Hatteras, by the U. S. Fish Commission, at Station 2602. It will be fully described and figured in the Report on the Voyage of the Albatross, under the name of *Pecten Tryoni*. Another small *Pseudamusium* (*strigillatum* n. s.), characterized by much elevated crowded concentric lamellæ on both valves, inflated and white, has been added to the fauna of the Antilles and Florida Reefs by Dr. Rush and the Albatross party. It is only about 10.0 mm. in height, but *P. Tryoni* measures over 60.0 mm. in height, and as much in width, and has much the oblique form of *P. phrygium*.

Leda acuta, Conrad (I. p. 251). An examination of Dr. Gould's type of *Leda unca* in the Gould collection at Albany, New York, shows that, in spite of the discrepancy between his description and the characters of *L. acuta*, his name is merely a synonym of *acuta*. Gould's type is a typical specimen of *L. acuta*.

Malletia (Tindaria) cytherea, Dall (I. p. 254). The shell described in the first paragraph on page 255 (Part I.) proves to be distinct from my original *M. cytherea*, and is figured here as *Malletia amabilis* Dall, Plate XL. Fig. 8. The original *M. cytherea* never attains the size of *M. amabilis*, and is of a squarer, less inflated, more *Cytherea*-like form.

Cryptodon (I. p. 267). A large specimen of *Cryptodon* which has since been received (about 17.0 mm. high) affords the following notes as to the soft parts. The foot is extremely slender (0.5 mm.) with a small spindle-shaped dilation at the distal end, circularly rugose, and about 40.0 mm. long, as contracted in alcohol. The gills are as long as the shell, or nearly so; the stem has a dorsal and a ventral lamina, and the dorsal lamina is reflected outward and downward, until its lower margin is on a level with the stem. There is only one pallial and branchial opening, with the edges posteriorly thickened or infolded but nearly smooth. The anal opening has no tube, but forms a simple long-ovate slit. The gills are free, except proximally, over two thirds of the whole length being unattached. The mouth is small, with a narrow raised edge like a Polyzoön epistome, but no palpi. The ovarian and hepatic lobules are attached on each side of the foot, and ramify from a central area of attachment in a very large number of short stout spongy lobules, recalling the digitations of some keratose sponges. The ova are minute and yellowish. The hepatic granules are dark brown or grayish. The whole mass of the genito-hepatic organs nearly fills the mantle cavity, and is larger than all the rest of the soft parts put together. These lobules are not like the pyriform projections of *Myonera*, each of which projects singly from the rounded surface of the visceral mass, and probably subsides after the period of ovulation. In *Cryptodon* the whole mass on each side arises from a single small area, and digitates afterward.

Several of the species referred to this genus in the Pelecypoda of the Challenger Expedition appear to me to belong near *Lyonsia* rather than with *Cryptodon*, judging by the figures of the shell.

In this connection I may observe that in a fine *Lucina* (of the type of *L. spinosa* Reeve), dredged in Panama Bay, I find the gill composed of a single lamina, or sac, on each side, hanging vertically from the mantle; the posterior lower edges are connected under the anal region, shutting it off from the branchial chamber; there are two small orifices without siphons, of which the anal is considerably the larger, but the lobes of the mantle, except in the siphonal region, are not connected below the adductors. As *Lucina* has been said to have two gill laminæ on each side, these facts are worth noting.

Lucina lenticula, Reeve (I. p. 265). The specimens cited from Station 21, in 287 fms., and from Barbados, in 100 fms., prove on further study to be young specimens of *L. multilineata* Conrad.

Lucina sagrinata, Dall (I. p. 265). This species has since been dredged off Cape San Antonio, in 300 fms., and at Station 2646, in 85 fms., off Cape Florida, by the U. S. Fish Commission.

Cardium ceramidum, Dall (I. p. 269). This species should be compared with *C. antillarum* Orbigny.

Meiocardia Agassizii, Dall (I. p. 271). This species is figured on Plate XL. Fig. 7, and in Agassiz, Three Cruises of the Blake, II., p. 74, fig. 311, 1888.

Callocardia (Vesicomya) venusta, Dall (I. p. 274). This species is figured on Plate XL. Fig. 5, and in Agassiz, Three Cruises of the Blake, II. p. 75, fig. 312, 1888. *Isocardia cytherioides* Mayer, Journ de Conchyl., XVI. p. 103, pl. iii. fig. 6, from the Lower Helvetian beds of Northern Italy, belonging to the Upper Tertiary, is probably a *Vesicomya*, judging by the figure. Another fine species of *Vesicomya* was obtained on the voyage of the Albatross, off Tobago, in 880 fms., ooze. It is very nearly the form and color of *Cytherea albida*, and reaches a length of an inch (25.0 mm.) or more. In this, which will be described under the name of *Vesicomya Smithii*, in honor of Mr. E. A. Smith of the British Museum, the teeth are closely like those of *V. venusta*, but more developed, the shell being larger and stouter. The pallial line is very faintly waved or truncate under the posterior adductor scar, and there is an incised line about the rather small lunule, as in the other species. Unfortunately the soft parts were not obtained.

A more interesting capture at the same haul of the dredge was a shell with the hinge of the original *Callocardia*, no distinct incised border to the lunule, and a deep acutely angular pallial sinus; this will form a section of the genus under the name of *Callogonia*. The species attains a length of two inches, having about the form of *Tapes turgida* Lam. as figured in the Thesaurus, and the exterior of the same dull straw-color, marked only by incremental lines, which characterizes the other species of *Callocardiæ* described in this paper. It will be named, in honor of Prof. L. A. Lee, directing the scientific work of the Albatross party, *Callocardia* (*Callogonia*) *Leeana*. It is remarkable that four species of this extremely rare group, and one of the still rarer genus *Meiocardia*, should have been found in so limited an area, and with little time expended in dredging.

Veneriglossa (I. p. 275). The genus *Atopodonta* Cossman, 1887, (Mem. Soc. Roy. Mal. de Belgique, XXI. p. 110, type *Venus coniformis* Deshayes, *op. cit.*, p. 111, pl. vi. figs. 3–6), appears to be identical with this group, if the figures of the type are to be relied upon.

Tellina (I. p. 277). *Tellina Antoni* Phil. and *T. squamifera* Desh. extend northward in moderate depths to the vicinity of Cape Hatteras, N. C. A single valve of *T. sybaritica* Dall has since been received from Florida. It is pure white. It extends to Brazil. *T. tenta* Say appears to reach the Antilles, where it is known as *T. Souleyetiana* Recluz.

Poromya elongata Dall (I. p. 283). This species was figured by Agassiz, Three Cruises of the Blake, Vol. II. p. 72, fig. 302, 1888. A figure is given herewith, Plate XXXIX. fig. 3. It belongs to the section *Cetomya*.

Poromya (Cetoconcha) bulla Dall (I. p. 283). This species was also figured by Prof. Agassiz, II. p. 72, figs. 300, 301, 1888, and is here shown on Plate XXXIX. figs. 2 and 5.

Verticordia perversa Dall (I. p. 289). This species is figured on Plate XXXIX. fig. 4. Prof. Agassiz figured it, II. p. 74, fig. 309, 1888.

Verticordia elegantissima Dall (I. p. 291). An adult specimen of this species is figured on Plate XXXIX. fig. 7, and was illustrated on p. 74, fig. 308, of the second volume of Prof. Agassiz's work.

Cuspidaria microrhina Dall (I. p. 295). This species is figured on Plate XL. figs. 2 and 3. It was figured by Prof. Agassiz, II. pp. 73, 74, figs. 306, 307, 1888.

Bushia elegans Dall (I. p. 310). This species is figured on Plate XXXIX. fig. 1. It will also be found in Prof. Agassiz's work above cited, II. p. 74, fig. 310, 1888.

The Anatomical Characters of Poromya (I. p. 280), **Verticordia** (I. pp. 285, 286), **Cuspidaria** (I. pp. 293, 303), **Myonera** (I. p. 303), **and related Forms.** — In 1886 I called attention to certain remarkable features in the anatomy of the above mentioned forms, among which were the facts that the foot is set in a socket or chamber, like a stopper in a bottle, that in *Cuspidaria* and *Myonera* gills in anything like the normal form of such organs are entirely absent, while in *Poromya* and a group which I distinguished as *Cetoconcha* there are gill lamellæ of a very primitive type sparsely distributed on the ventral surface of the septum which forms the floor of the upper half of the peripedal chamber. In accordance with these investigations I modified the classification of these animals, establishing three families for their reception. Part of my material was in a rather poor condition, having been partially desiccated either before or after it had first been placed in alcohol, and that part, especially in the *Cuspidariidæ*, which was in good condition was represented by very minute specimens. Since then, two years after the publication of my Report on the Pelecypods of the Blake Expedition, Dr. Paul Pelseneer of Brussels has published in the Comptes Rendus of the Acadamy of Sciences, Paris,* and in a brief Report on the Anatomy of the Deep Sea Mollusca, in the Challenger series, † some important observations on animals of the same groups. To the facts brought forward by me, which were for the most part abundantly confirmed, and the classification above referred to consequently adopted, he was enabled, by the better character of his material, to add that the two halves of the peripedal chamber correspond to the anal and branchial, or excurrent and incurrent siphons, respectively; and that in the septum, beside the opening in which the foot is set, there is a series of minute openings on each side of the median line, which in *Poromya* are situated between the lamellæ of the rudimentary gills, and in *Silenia* Smith (non Mulsant, = *Cetoconcha* Dall) the lamellæ themselves have a subtubular form. He also determined the existence, in certain species of *Cuspidaria*, of minute rudimentary palpi, which the condition of my specimens had not allowed me to observe, if present. In addition to this he provided diagrammatic figures, which, if they cannot be said to illustrate with detailed anatomical accuracy the animals represented, at least enable one to clearly understand what was present in his mind. We are therefore under considerable obligations to Dr. Pelseneer, who has materially increased our knowledge, and the fact that he has, as far as was possible, omitted reference to my prior observations and their publication in Part I. of this Report, does not render his confirmation of them less useful.

However, in reviewing the subject with additional and well preserved material collected by the U. S. Fish Commission Steamer Albatross in the West Indies, and on her voyage thence to California, I am enabled to add to and correct the data of the earlier part of this Report, and to advance the subject beyond the point which it has hitherto reached. I hope also, that, in the conclusions which I draw from these observations, the relations of the forms in question to Pelecypods of a more ordinary type will be a little more clear than they were left by the light of some of Dr. Pelseneer's transcendental hypotheses.

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* Séance of April 3, 1888.

† Vol. XXVII. Part LXXIV., 42 pp., 4 plates, 1888.

Before discussing matters of theory, the observed facts will be briefly stated.

True Ctenidial Septa in Pelecypods. — There are a large number of acephalous mollusks, not necessarily nearly related, in which a true branchial septum exists. In a young *Perna*, supposed to be *P. ephippium* L., the inner edges of the ctenidia are united to each other their whole length, behind the foot. The outer edges are attached to the mantle or visceral epiderm, so as to form a complete chamber like that of *Cuspidaria*, but of which the derivation is radically different. In *Modiolarca trapesina* Lam., from Cape Horn, the ctenidia, from below the anal siphonal orifice to and around the foot, are united as in *Perna*. The chamber thus constituted is crammed with the young fry at the proper season. In *Lyonsia Beana* Orb., the united ctenidia are attached above the rudimentary siphonal septum, and extend forward to and around the foot. They are attached to each other and to the mantle or to the ventral surface of the visceral mass by their edges, and form a most complete chamber, a true ctenidial septum. There are, however, no orifices in this or in any of the species with a strictly ctenidial septum, corresponding to the septal perforations in *Poromya* or *Cuspidaria*.

In *Lyonsiella radiata* Dall, a large new species from Patagonia, we have a similar state of affairs, except that the anterior inner edges of the gill are not so closely united around the foot. The part played by the siphonal septum in this species is insignificant; it is in fact hardly perceptible. The infolding of the mantle edge around the siphon is very wide; its outer edge is nearly plain; within this edge a short distance, is an elevated ridge with a single row of small rounded ocellus-like tubercles on each side of it. A wide space separates this range of processes from the margin of the branchial orifice, which is profusely papillose with arborescent papillæ. A lunate depression lies between this and the much smaller, plain-edged, nearly linear anal orifice, while in front of it the pedal opening forms a minute narrow slit, with granulated margin. In this form the palps are represented by a slightly raised edge around the mouth, not produced or elongated at the sides. A languette or curtain valve hangs behind the branchial orifice below the narrow septum.

True Siphonal Septa in Pelecypods. — A partial siphonal septum is common among Pelecypods, especially short-siphoned forms, where the internal septum may, to a certain extent, make up for the absence of the long and complete division between the passages in those forms with long siphons. The septum is usually a mere subtriangular thin membranous shelf, the posterior extension of the tissues which separate the two siphons, while from near its lateral corners radiate the muscles which in those forms with a pallial sinus serve to retract the siphons. Below it is the more fleshy languette or curtain valve which closes the incurrent siphonal opening when required. Among those forms in which we may find the septum especially well developed are the different groups of the old genus *Cardium*. In *C. edule* a short septum is present, and is figured by Deshayes (Moll. Algerie, pl. xcvii. fig. 6), in which an opening appears above and behind the valvular languette. I suspect this to be due to lesion, as I have not found such an opening in any of the species of *Cardium* I have examined. In another species, *C. hians* (*op. cit.*, pl. xcvi. fig. 2), the septum is considerably extended forward. A beautiful new species of the subgenus *Lophocardium*, from the coast of Lower California, has the ordinary gills of *Cardium* well developed, with their posterior anchorage above and near the siphonal septum at its origin. The thin, slightly fibrous, but nowhere fleshy septum, extends forward to the foot and on each side of it. In this case there is no orifice above the languette, or elsewhere in the partition. Doubtless an exhaustive search would find many other groups in which certain members exhibit a siphonal septum, more or less completely dividing the peripedal chamber. Until the character has become more particularly specialized and permanently established, it is evident it can have but a minor value as a guide to the systematist, or a test of his classification.

In those forms in which the retractor muscles of the siphons radiate in a vertical plane to the shell, forming a "pallial sinus" (e. g. *Poromya mactroides*), the siphonal septum, whether large or small, is membranous; in those without a sinus (e. g. *P. granulata*), it is more or less muscular.

CUSPIDARIIDÆ. *Cuspidaria patagonica* Smith. A fine specimen of this species, measuring 44.0 mm. in length, and 14.0 mm. in transverse diameter was dredged in about 400 fms., off Manta, Peru; other specimens were found in dredgings from the whole eastern coast of South America, the western coast of that continent, and northward as far as Lower California. The larger specimen afforded the following notes.

The siphonal septum, by which name I shall refer to the dividing septum of the peripedal chamber, extends forward from the proximal end of the siphons to the anterior adductor. It is divisible into three areas, a longitudinal central muscular area occupying about two thirds of the whole septum, and on each side a less muscular thin and tense membranous strip, which is connected with the inside of the valves and leaves the imprint on the shell which would ordinarily be taken for the outline of the "pallial sinus." The central muscular area is attached by a bundle of muscular fibres above each adductor on each side of the median line. All four points of attachment leave well marked scars on the shell. I shall show hereafter that these muscles, if not homologous with, at least perform the functions of, the siphonal retractors of ordinary Pelecypods, and in forms like *Poromya mactroides*, where the usual retractors are present, the siphonal septum is destitute of muscularity, or possesses it only to an inferior degree. The posterior septal muscles are smaller and rounder in section, more vertical in direction, and more widely separated from each other, than the anterior pair. The latter are narrow and elongated on their surface of insertion, and but for the separation of the valves would nearly touch in the median line. The principal body of fibres on the plane of the septum is longitudinally arranged, another series crosses the septum in an arched manner toward its extremities, especially behind, while there are indications of still smaller series of more or less radiating fibres knitting the whole fabric together and to the shell.

The siphonal septum in this species divides the cavity of the shell unequally, the upper portion being smaller than the lower. In the upper, sustained especially by a median fibrous mesenteric band, is suspended the visceral sac. Viewed from above, it is subcordate in profile; from the side it seems acutely ovoid. It occupies, as contracted by alcohol, about half the cavity above the septum. The valve of the anal siphon is represented above the septum by a thin vertical wall of membrane pierced by a relatively small simple central orifice. The valve of the branchial siphon below the septum is composed of three rather thickish processes; one, hanging vertically, is short, wide, and represents the languette in *Cardium;* the lateral processes are somewhat longer and obliquely set, the whole forming a large subtriangular opening with three partially overlapping curtains. Passing backward on the ventral surface of the septum, aside from the streakiness due to the fibrous coarse muscular tissue, there is a distinct narrow median depression behind the foot, except just behind the edge of the foot, where the surface in all the forms with a muscular septum is elevated like a wave rising about a solitary rock. The foot is slender, elongated, slightly geniculate, with a small byssal groove behind. Immediately in front of it the surface is depressed about the small and inconspicuous mouth. Here the anterior palps are almost wanting, but the posterior, though abnormally small, are elevated above the surface and strongly transversely striate. In front of the palps is a strong ridge of tissue, behind the anterior commissure of the lobes of the mantle. Here a narrow horny or chitinous gusset strengthens the commissure, above which is a sort of pocket or shallow indentation, above which the external margin of the mantle finally joins. The gusset is narrow, concave in the middle, with its ends spatuliform, and shows brown through the white tissues, like the jaw of a Gastropod.

If the surface of the septum near the foot be closely scrutinized, there will be seen on each side four slight prominences. The anterior pair are on each side of the mouth, the second and third pairs by the sides of the foot, the fourth behind the foot, all situated in the thickest part of the muscular portion of the septum. The posterior pair have two lips, the others three, to each prominence, and on gentle pressure with a fine probe it will be found that a small circular orifice passes somewhat obliquely through the septum and communicates with the upper chamber.

These passages are not always complete, however, for by means of careful sectionizing I found the third pair imperforate in a fairly grown specimen of *C. rostrata,* while in several young specimens the two posterior pairs seemed imperforate. In a specimen of *C. arctica* var. *glacialis* I found five orifices on each side, showing that the number is not invariable.

The lips to these orifices are not prominent, much less so, indeed, than in *Cetoconcha* or *Poromya.* The office of a gill must, therefore, as suggested in the first part of this Report (p. 303), be performed by the surface of the septum, or by the lobes of the mantle. This is a very different view from Dr. Pelseneer's idea that the septum is itself homologous with the ordinary gills of Pelecypods.

By cutting the lobes of the mantle away, and carefully turning back the septum as a whole, extracting the foot from its socket, we see the simple oblique upper ends of the septal orifices. What can their office be? I suppose that they serve to admit fresh water to the upper chamber, which I believe to be utilized in some, if not all, instances as a marsupium. It is probable that, by suitable muscular contractions, the septum will operate somewhat like the washer of a pump-valve, and that the upper chamber can be filled or emptied of its contained water at will.

I believe the septum in *Cuspidaria* to be homologous with the ordinary siphonal septum, only more prolonged; and that its muscular tissue is the equivalent of the siphonal retractors of ordinary Pelecypods. I do not regard it as in any manner homologous with the normal ctenidia.

Myonera paucistriata (I. pp. 302, 303). To the description of the soft parts of this extremely fragile and delicate form already published, several points can be added from the examination of a fresh specimen recently received. The only correction to the original description relates to the opening of the anal siphon, which is a minute circular orifice in a delicate membranous area which in life probably projects in a dome-like manner, but in alcohol appears tense and flat. The opening is into the upper portion of the peripedal chamber, of course, as in the other species. That which I took for the anal opening in the first specimen examined was an accidental lesion, while the true anal opening from its minuteness was overlooked.

The mouth, as stated in 1886, is a simple opening without palpi. The latter are represented, if at all, by a delicate slightly elevated ring of tissue which surrounds the circular mouth. The absence of gill laminæ is fully confirmed. The septal orifices on the ventral surface are hardly observable without the closest scrutiny, though easily visible on the dorsal surface of the septum. There are eight, as in the *Cuspidaria patagonica*, and their lips, slightly elevated, usually appear triple, so as to give a triangular aspect to their junction. When sounded by a delicate probe they appear subtubular.

The muscular tissue of the septum is concentrated in two bunches of coarse fibre-bundles, which radiate from the posterior outer corners of the septum, suggesting that the fibres, usually devoted to retracting in a nearly vertical plane the siphons toward their angular insertion (pallial sinus) on the shell, are here spread in a horizontal plane. Beside the fasciole of fibres at the corners, there is a loosely arranged central bundle behind the foot, while the rest of the septum is more thin and fibrous, and the vertical roots of the septal muscles far less strong and prominent in proportion, than in *Cuspidaria*. The arrangement of the fibres of the muscular tissue is singularly loose, and in the central area irregular, — quite different from the solid tissue of the septum in *Verticordia*, or the compact bands observable in *Cuspidaria*.

The most noticeable feature in this specimen was the condition of the ovaries. These ramified over the posterior part of the visceral mass, terminating in bifurcated or trifurcated sacs, largest at their distal extremity, and somewhat fig-shaped. These were crammed with ova and projected from the surface of the visceral mass into the upper chamber above the septum. All were turgid; some had already burst, and partly discharged their contents into the chamber; others seemed on the point of doing so; the alcohol had coagulated the escaping ova *in situ,* in the most perfect manner, the whole process thus being displayed. It is probable, as suggested by me in 1886, that the chamber serves to some extent as a marsupium or shelter for the ova and young, and that they are not discharged into the surrounding element at once. This is undoubtedly the case in *Modiolarca.*

VERTICORDIIDÆ. *V. acuticostata* (I. p. 285). Another specimen, and a re-examination of the one reported on in 1886, confirm the description then given. There are no palpi, the anterior pair are wholly unrepresented, the posterior or lower pair may be represented by two small rounded hardly elevated tubercles between the mouth and the anterior ends of the gills. The foot is relatively extremely large, round, and stopper-like. The gills in the second specimen are clearly adnate, as in Pelseneer's figure of *Lyonsiella papyracea* Smith (pl. iii. fig. 1), except that they are underlaid by the solid fleshy siphonal septum, and do not as in *Lyonsiella* serve to supplement that septum. They are proportionately very much smaller, hardly reaching behind the middle of the foot. I suspect that the free end of the gill in my first specimen was separated by a lesion, and is not normal, but that the gill is always adnate in the adult condition.

The septum is thick and fleshy, quite destitute of perforations or orifices except that in which the foot stands.

Verticordia tornata Jeffreys, by an accident, was not struck out of the list of *Verticordiæ* (I. p. 286) after I had determined it to belong to *Poromya* (I. p. 281).

The balance of characters will perhaps carry *Mytilimeria* and *Lyonsiella* to the *Anatinidæ,* or a family by themselves, rather than to the *Verticordiidæ,* where I placed them. But they are transitional in their relations, and in spite of the relations between the form of the gills in *Lyonsiella* and *Lyonsia* I am still inclined to think the former almost equally close to *Verticordia.* The discrepancy noted by Pelseneer arises from the fact, that, instead of comparing *Lyonsiella* with a genuine *Verticordia* like *acuticostata,* as I did, he compares it with a species of *Poromya,* which is, of course, a very different thing.

POROMYIDÆ (I. p. 280). In 1886 I separated from *Poromya* the forms which, when adult, have the hinge teeth obsolete, under the name of *Cetoconcha.* This group included not merely those with a double posterior row of modified septal orifices on each side, such as *C. bulla,* the type, and *C. margarita,* but also certain species of *Poromya.* in which the hinge teeth are feeble or obsolete in the adult, while in the typical *Poromya* they continue strong. I called attention to the fact that the soft parts of these species did not differ essentially from *Poromya* (I. p. 280), but hardly felt justified in separating them from the typical *Cetoconchæ.* It is probable that it would be better for them to form a section of *Poromya,* which may be called *Cetomya;* while the typical *Cetoconcha* may perhaps be generically separated from *Poromya.* The group in question was named *Silenia* by Mr. E. A. Smith, in his Report on the Challenger Lamellibranchs, but that name had already been used in zoölogical nomenclature, and so was preoccupied. The observations of Pelseneer on the anatomy of *Silenia* leave no room for doubt that it is identical with *Cetoconcha*, as represented by its type and by *C. margarita.* Now that wider research has shown more clearly the characters of *Poromya* and *Cetoconcha*, the attempt of 1886 to diagnose both forms in a single definition seems confused, but with this explanation it should be clear enough that the facts were observed and recorded in members of each group, and that the apparent confusion in the diagnosis resulted from a feeling of conservatism in the matter of subdividing genera; a proceeding which has, of late years, on some occasions been so shamefully abused.

The researches of the U. S. Fish Commission have added some most interesting and peculiar species of this family, which will be more fully described and figured in the Report on the Voyage of the Albatross, now in preparation.

Cetoconcha bulla Dall (I. p. 283). The description of 1886 merely requires the addition of the statement that the lamellæ described are subtubular, and form the lips to the septal orifices. In using the term "ventral surface," for the under side of the septum and "body cavity," the reader will not be misled into the supposition that the *visceral mass* was the "body" intended; for, though the words may have been ill chosen, the relations of the visceral mass were clearly stated, although the very important relation of the upper chamber to the anal siphon was not understood at the time.

There is in this species a distinct bunching of the muscular fibres at the posterior outer corners of the septum, from which points they extend in a somewhat radiating manner. The soft parts, though more rotund, and with a different number of septal orifices, resemble sufficiently those of *Cetoconcha Sarsii* Smith, as diagrammatized by Pelseneer. For each orifice two lamellæ are usually counted in the Report of 1886, as the lips of the septal orifices generally appear paired and arched, forming a segment of a circle. In *C. bulla*, in the anterior series there are five orifices on each side; the inner posterior series have three to five, and the outer posterior series two, or possibly three orifices each. The number of posterior orifices is not the same in the two specimens of *C. bulla* examined.

In none of the specimens of *Cetoconcha* examined by me were the inner ends of the four posterior series so widely separated as in Pelseneer's figure 9, of *Silenia Sarsii.* They always seemed closer together, and more evidently radiating from a central elevation on the septum behind the foot. But too much stress must not be laid on the discrepancies of these diagrams, which are not, and do not appear to be intended for, exact and complete portraits. In this species a trace of the lateral arrangement of the siphonal muscles remains, while, compared with *Cuspidaria,* the septal muscles are still in a transitional state.

Cetomya elongata Dall (I. p. 283). In the single specimen of this form, the branchial areas are composed of lamellæ, between which at their bases are narrow fissures bridged longitudinally by slender fibres which act as regulators. In this species the two areas are similar, and resemble those of *Cetomya tornata* Jeffreys, as figured by Pelseneer.

In *Poromya sublevis* Verrill, dredged by the Albatross, in 1685 fms., off Chesapeake Bay, by carefully dissecting away the septum, which presented much the same appearance as that of *P. granulata* in Pelseneer's diagram (*op. cit.*, pl. iii. fig. 7), several interesting facts were disclosed. The posterior lamellæ were not separated by fissures at their base. This seemed evident on an external view, but was made more certain by an inspection of the upper surface of the septum, where these openings, when they exist, are always conspicuous. The anterior areas were fissured, especially near the foot, but less so behind, so that when I first examined this species, taking the extreme delicacy of the membranes into account, and the apparently imperforate character of the posterior areas, I suspected that the fissures were due to tearing or incautious probing. A reversal of the septum, and an examination of other species showed, however, that there are variations in this respect, and that Pelseneer had correctly described the conditions which exist in some of them. An interesting feature disclosed by the examination of the septum under transmitted light was, that the blood-vessels which supply the branchial lamellæ appear to reach them from behind, a separate vessel starting from the vicinity of the siphons, and running a somewhat irregular course to each of the lamellar areas on each side. There seemed to be no continuation of these vessels anteriorly in front of the areas which they serve. The ovisacs are not lobulated, as in *Myonera*, but more evenly spread over the posterior surface of the visceral mass. The ripest eggs were large and conspicuous. There was no evidence of their extrusion through the covering of the visceral mass, as in *Myonera*, though this may take place later.

Cetomya albida (I. p. 282). In young specimens of this and other species, the membranes of the septum, etc. are extremely delicate. The use of too concentrated hardening agents, or the incautious touch of a probe, will produce lesions which may be indistinguishable from normal fissures. To make sure that nothing of this sort shall happen, it is necessary to float the soft parts in a cup of water, and turn them about with delicate forceps. This is not convenient in all respects for observation, but with time and patience the characters may be made out.

Young specimens of this species show the lamellar areas as usual, with the depressions above them in the floor of the upper chamber, but the fissures are not open; a fact which leads me to believe that they appear only with maturity. A very delicate membrane seems to hold the distal margins of the lamellæ together, so that a delicate probe passes over without separating them. It was only after long experimentation and study of the specimens that I became convinced that this is the case, although there is no inherent improbability that it should be so.

Poromya (*Dermatomya*) *mactroides* n. s. This fine species differs from the typical form of the genus in the absence of the superficial granulations, and in the presence of a deep and strong pallial sinus, which characters indicate that it should form a special section of the group. The hinge is also remarkably coarse and strong. It was dredged by the Albatross off the coast of Ecuador, in 741 fms., and externally presents much the appearance of a large high specimen of *Mactra lateralis*.

In the type of *Poromya* the pallial sinus is almost obsolete; its retractor muscles are either mainly incorporated in the septum, the muscular contractions of which serve to move the siphons, or they are replaced by the septal muscles. In the present species, however, there is a large and strong pallial sinus with its usual muscles, and the septum is consequently only very slightly furnished with muscular fibres, and does not serve to retract the siphons. The valve to the branchial siphon is large, and the palps are enormous. The anterior edges of the anterior palps are notched or papillose toward the median line, a condition not observed in the other species. The foot is pointed and slightly geniculate. There are seven anterior, and eight or nine posterior gill lamellæ; the two areas are rather narrow, and their ends closely approach one another near the middle of the foot on each side. In front of the ridge which precedes the large branchial valve, and between it and the foot, are four or five quite prominent elevations of the surface closely resembling the branchial lamellæ, but with their length in the axial direction of the animal. There are no fissures between these, but they seem very like branchial lamellæ in process of development. Both the longitudinal branchial areas on each side are fissured, and their blood-vessels reach them from behind.

General Considerations on the Nature of the Septum in Poromyidæ and Cuspidariidæ. — The facts above stated indicate that the septum in these groups is essentially a prolongation forward, and a specialization of the ordinary siphonal septum. The septum, as pointed out in *Cardium*, may be so prolonged, while the normal gills are fully developed and unconnected with it. In *Verticordia* it may be so prolonged, and may have acquired a conspicuously fleshy texture, without fissures, while the gills lie prone upon it, more or less adnate. The muscular apparatus by which the siphons are retracted, and whose normal points of origin are at the side of the ordinary septum, appear to be shifted to its surface; different species show this process in different stages of progress, and in the only case among the Poromyas where the fibres follow the normal direction in other Pelecypods, the septum is destitute of the muscular structure which is so prominent in the other Poromyas. In the specialization of the septum the musculation develops from behind; when branchial laminæ are situated upon the septum, and are not simply the ordinary ctenidia in an adnate condition, the addition of a second series is made at the posterior end, and all the branchial areas appear to receive their blood supply from behind.

There is not a particle of evidence to prove that the septal branchial lamellæ of *Poromya* and *Cetoconcha* are homologous with the ctenidia of *Verticordia, Lyonsiella, Perna,* or *Cardium*. The fact that *Cuspidaria* has neither ctenidia nor any specialized laminæ on the septum lends probability to the assumption that the two series represent a parallel among these Pelecypods to the ctenidia and the peripedal laminæ in *Acmæa*, *Scurria*, and *Patella*, among the *Docoglossa*. That is, that the septal laminæ are a new and special development, which functionally replace, but are not homologous with, the original ctenidia. If this view is doubted, the burden of proof lies upon those who call it in question.

It may be asked whether any hypothesis can be suggested by which this peculiar specialization may be accounted for. The law of economy in development, which calls for the maximum of function with the minimum expenditure of tissue, and the other rule, which associates with greatest vigor of life the most successful oxygenation of the blood, together with the obvious benefits to be derived from temporary protection of the newly hatched larvæ, will enable us to suggest an answer.

The prolongation forward of the siphonal septum, especially in forms with short siphons, like *Poromya* and *Lyonsiella*, will evidently promote successful aeration of the blood by cutting off from the branchial chamber the water of the anal chamber, fouled more or less by the effete products discharged into it. A certain amount of fibrous tissue must be developed to form this septum. It is clear that an economy of tissue would result from the transfer of retractorial functions to the septum and the obsolescence of the lateral retractile musculature. A further economy would result from the utilization of this large sheet of tissue for branchial purposes, and a diminution of the tissue previously expended in the mass of the ctenidia. The habit of the larvæ, so common among Pelecypods, of nestling for safety in the branchial folds, would lead directly to the utilization of the chamber as a refuge. But a close chamber such as we see in *Verticordia* would, from the less pure character of its contained sea-water, be less favorable than one into which the water could be more freely admitted by any means which would not imply an admixture of the foul water with that of the branchial chamber below. A system of orifices like those of *Myonera* would accomplish this. A subsequent development of the muscular tissue of the septum, so that it could operate somewhat after the fashion of a pump and voluntarily frequently renew the water in the anal chamber, would obviously be beneficial. By the effect of stimulation, the margins of the orifices thus subjected to repeated strong currents of fresh water would be likely to undergo a specialization of respiratory functions as compared with the rest of the surface of the septum, which would result in something like the tubular gills of *Cetoconcha*, or the lamellæ of *Poromya*.

The reciprocal diminution of the ctenidia and increase of the area of the siphonal septum are illustrated by such a series as *Lyonsia*, *Lyonsiella*, and *Verticordia*, all of which possess true ctenidia.

The gradual specialization for branchial purposes of the septum after the extirpation of the ctenidia would be illustrated by the series from *Myonera* and *Cuspidaria* to *Cetoconcha* and *Poromya*.

While the above chain of hypothesis harmonizes with the observed facts in a satisfactory manner, it is stated merely as a possible hypothetical explanation, and not as a theory to which the writer must stand permanently committed.

General Summary. — Premising that in this article the word *ctenidium* is employed to designate the normal typical gill of Pelecypods, in any of its modifications, as opposed to temporary or local branchial organs of different origin, the facts just reviewed may be briefly summarized.

1. In many groups of Pelecypods the ctenidia are more or less united behind the foot, so as to divide the peripedal chamber into an upper, or anal, and a lower, or branchial portion. In these cases (*Perna*, *Modiolarca*, for example) there is no important modification of the structure of the gills, and the septum is truly branchial in character, and the siphonal septum takes no part in the formation of the partition.

2. In other forms, the siphonal septum is extended forward to form a partition, either (A) unmodified (*Cardium*); (B) thickened without orifices (*Verticordia*); (C) assuming a retractile function (*Cuspidaria*) with orifices; (D) only partially retractile (*Dermatomya*) with single lateral series of orifices; or (E) with an incomplete double lateral series of orifices (*Cetoconcha*). In these cases the breathing organs may be (A) unmodified ctenidia, (B) depauperated adnate ctenidia, (C) the general surface of the septum without ctenidia or specialized lamellæ, (D) with only specialized flat lamellæ, or (E) with specialized subtubular proliferations. In these cases the structure of the septum appears to be wholly independent of the ctenidia, though in *Verticordia* they are adnate upon its surface.

3. There is one form (*Lyonsiella abyssicola*) in which the siphonal septum and the ctenidia are stated to be mutually attached, so that the septum may be said to be of a compound formation, though in another species of the same genus (*L. radiata*) the septum is of the kind described in paragraph 1.

4. The orifices in the septum of *Poromya* seem to be closed, or partly closed, in youth, and open with the attainment of sexual maturity.

5. The anal chamber, as indicated in 1886, seems to fill the office of a marsupium.

6. The tissues of the septum may therefore be derived from structures diverse in their origin, in some cases ctenidial and anterior, in others siphonal and posterior.

7. Finally, from these facts it is evident that Dr. Pelseneer's assumption, that the septum is essentially ctenidial in its origin, is unwarranted, and his group *Septibranchia*, as defined by him, is founded on an error of observation. While as a group-name it may be used to indicate features of structure whose origin he misunderstood, yet, from the purely adaptive nature of these features and their variations in forms otherwise closely related, the name has no claims for adoption either in a strictly genealogical or an eclectic system of classification. It may be added, that the "proof" that *Poromya* and *Silenia* (= *Cetoconcha*) are more nearly related to each other than to *Cuspidaria*, which Dr. Pelseneer claims to be his work (*op. cit.*, p. 25), had been published by me more than two years previous to the appearance of his paper, and exemplified in the classification I then proposed; a classification which nothing since published has pretended in any way essentially to modify. This classification,

augmented by the new discoveries of the past three years, may be expressed in brief as follows: —

Family *Cuspidariidæ*: abranchiate, siphoseptate, septum foraminate.

Genus *Cuspidaria* (etc.) with long siphons; oral palpi obsolete.

Genus *Myonera*, short siphons; oral palpi absent.

Family *Poromyidæ*: septibranchiate, siphoseptate.

Genus *Poromya*: teeth strong; oral palpi large; foramina of septum slit-like, between the close-set lamellæ, arranged in two interrupted longitudinal series; pallial sinus obsolete; surface of shell granular.

Subgenus *Dermatomya*: shell not granular; pallial sinus developed; hinge strong.

Subgenus *Cetomya*: shell granulous; pallial sinus obsolete; hinge teeth obsolete in the adult.

Genus *Cetoconcha*: hinge teeth obsolete in the adult; pallial sinus obsolete; siphoseptum foraminate, the foramina arranged in four longitudinal series, solitary, the subtubular lips filling the office of gills.

Family *Verticordiidæ*: siphoseptate with small adnate ctenidia; oral palpi almost obsolete; septum imperforate.

Lyonsia and probably *Lyonsiella* may be called branchioseptate, and should be referred elsewhere.

ADDENDA TO PART II.

Intra-capsular Development of the Shell in Scaphella (II. p. 149, ¶ 3). After this suggestion had been some time printed, I received from the collections of the Albatross on her voyage from Chesapeake Bay to California, some ovicapsules of *Scaphella magellanica* from the coast of Patagonia.

These ovicapsules are circular, about an inch (25.0 mm.) in diameter, with a flat base attached to dead Pectens; the upper part consists of a rounded dome, rather more lenticular than hemispherical, but varying somewhat in different specimens. It is exactly like the ovicapsule of *Volutopsis* from Alaska, externally, and, like that, contains two to four surviving larval shells. These remain in the capsule until they have three or four shelly whorls. The apical point is acutely conical, slightly twisted, and in the youngest specimens (two-whorled) still retains some shreds of the extremely fragile membranous protoconch adhering to the first whorl. As suggested by me from a study of the nuclei of *Aurinia*, the pillar of the protoconch and the apical spur of the larval shell coincide. The shape of the protoconch could not be ascertained, but its aperture was probably oval, from its traces left on the shelly surface. The apex is at first very sharp, but it loses substance even in the ovicapsule, and three-whorled specimens had it quite blunted, while shells escaped from the capsule at all stages show usually a mammillary tip. The largest larva obtained, though it had just begun to make part of the shell showing color-pattern, was still without cephalic tentacles, eyes, or siphonal appendages. It had no trace of an operculum or epipodium. The shell showed two plaits on the columella. The confirmation of the existence of the suspected protoconch is particularly gratifying. The larval characters emphasize the differences between *Voluta* proper and *Scaphella*, and leave no doubt of the propriety of their generic separation. The turbinate shelly peculiarly sculptured larval shell of *Voluta* is entirely different from anything we find in *Scaphella*.

Vermicularia lumbricalis LINNÉ (p. 261). For those who doubt this being the original *V. lumbricalis* of Lamarck, the "Vermet" of Adanson, it may be noted that the American form has been named *V. spiratus* by Philippi (1836), and *V. radicula* by Stimpson (1851), while the Adansonian shell, on the ground that it is not the *Serpula lumbricalis* of Linné, has received the name of *Adansonii* from Hanley.

Nudibranchiata. Dr. Bergh, who is preparing a special report on this group from the material collected by the Blake, informs me that seven species are represented, as follows: —

Tethys leporina Linné (var.).
Chromodoris sycilla Bergh.
Chromodoris punctilucens Bergh.
Chromodoris scabriuscula Bergh.
Nembrotha gratiosa Bergh.
Phlegmodoris? anceps Bergh.
Phyllidiopsis papilligera Bergh.

The interesting features of these animals are left for Dr. Bergh to describe; the list is here included only to complete the number of Gastropods in the Blake collection.

SUMMARY.

The attempt to prepare a summary of bathymetrical data for the deep-sea fauna of any region yet investigated, is most unsatisfactory in its outcome from the paucity of data. Most of the species of any collection are represented by the shells alone, which may have been — as millions are daily — disgorged by fishes, and never have lived at the depth from which they were dredged. We are yet ignorant as to whether the abyssal and archibenthal faunæ shade gradually into one another, as seems most probable; or whether there is any line of depth, coincident with a temperature limit, which really fixes a boundary for the abyssal fauna.

Then, again, the difficulty and time involved in a cast of over one thousand fathoms are so much greater than if it were made in half that depth, that it is impossible to say what proportion of the disparity in population between the archibenthal and abyssal areas, which dredgings seem to indicate, is due to the fact that the latter have been far less efficiently explored. The only thing of which I feel confident is that it is yet too early for extensive numerical comparisons or deductions based only on statistics. I shall therefore content myself here with a very modest table, which is intended to illustrate the peculiarities of the Blake collection, expressly disclaiming any intention of applying the results to the deep-sea population at large, except "with all reserves."

In a general way, I may observe that the results sustain the biographic generalizations of the Introduction to Part I. There is nothing in that summary of the conditions of abyssal life which seems, so far, in need of serious modification. On the other hand, several of the hypotheses there advanced have received substantial support from subsequent investigation.

In that preface the littoral zone or area was defined as that part of the sea bordering on the land not too deep for the existence of marine vegetation; in a word, about the area included between the dry land and the hundred-fathom line. Thence to about one thousand fathoms extends the archibenthal area, beyond which we find the abyssal region.

The Tables relate only to the species which appear in antique type in the text, thus eliminating most of the forms introduced for purposes of illustration. I have been assisted in making the enumeration by Mr. Gilbert D. Harris of the United States Geological Survey. The first Table shows the general numerical results for the Blake collection, assorted among the great systematic groups and the three bathymetric zones or areas. The second Table shows the proportion to the whole population of the abyssal region borne by those genera which exceed a single species. The result here shown is that less than thirty-seven per cent of the genera comprise more than sixty-eight per cent of the species; and out of these, three families, *Pleurotomidæ*, *Ledidæ*, and *Den-*

taliidæ furnish nearly twenty-eight per cent of the species of the abyssal fauna collected by the Blake.

TABLE I.

General Numerical Results.

Groups.	No. of Genera.	No. of Species.	Species in the			Species common to		Abyssal Fauna.	
			Littoral Area.	Archib. Area.	Abyssal Area.	Two Areas.	All Areas.	Families.	Genera.
Brachiopods . .	7	13	8	12	3	8	2	2	3
Pelecypods . .	52	170	98	114	31	64	10	15	19
Scaphopods . .	2	35	17	28	12	17	5	1	2
Gastropods . .	119	491	280	222	83	161	32	29	41
Totals . . .	180	709	403	376	129	250	49	47	65

TABLE II.

Genera represented by more than one Species in the Abyssal Area.

Genera.	No. of Species.	Genera.	No. of Species.
Mangilia	17	Fluxina	2
Margarita	5	Liotia	2
Pleurotoma	4	Leptothyra	2
Drillia	3	Cocculina	2
Marginella	3		
Scala	3	Leda	5
Calliostoma	3	Limopsis	3
Triforis	3	Pecten	3
Actæon	3	Abra	2
Utriculus	2	Myonera	2
Fusus	2		
Columbella	2	Dentalium	8
Benthonella	2	Cadulus	4

Total, 24 genera and 87 species.

For the naturalist of to-day the most interesting feature of abyssal life is not that it furnishes him with singular and archaic forms, useful in his study of extinct genera; nor the beauty and rarity of the creatures living under such unusual conditions. The most important characteristic of abyssal life is, that it, and it alone, exhibits a fauna in which reciprocal struggle is nearly eliminated from the factors inducing variation and modification. There is no mimicry or sexual selection where all is dark. In the struggle for life of the abyssal animal, he is pitted against the physical character of his environment, and not against his neighbor or the rest of the fauna. Hence we should have, and really do have, the process of evolution less obscured by complications in the abysses than is possible elsewhere. From a study of these animals in the light of their environment, much may be hoped toward the elucidation of great questions in Biology, and naturalists everywhere should strive to promote deep-sea dredging as essential to the progress of Science.

The circumstances which lead to the belief in the absence, more or less complete, of competition between the members of the fauna, are not hypothetical, but admitted facts. The "rain of food" from the sinking of weak or dead surface forms is unquestionable, and the supply must, in the nature of things as we know them, far exceed the demand, except in cases where physical factors, such as currents, intervene to prevent the supplies from reaching the bottom. It is illustrated by the absence or obsolescence of protective devices in deep-sea species, without regard to systematic relations. The genus most abundantly represented of all is *Mangilia*, which is devoid of an operculum, and the diminution in size and solidity of this protective appliance is marked in all the deep-sea gastropods. Nearly all the species are carnivorous by hereditary tendency; those which are not, like the *Trochidæ* and *Docoglossa*, become so by necessity. Long reflection on the ornamentation of the shell in deep-sea gastropods has led me to the conclusion that the characteristic features may be accounted for on mechanical principles. The presutural rows of nodules so characteristic of many abyssal gastropods (as in *Daphnella limacina*) serve as buttresses for the strengthening of the fragile and delicate structure which bears them. Impermeable solidity is something not to be expected in organic structures subjected to the immense pressures of the depths. Strength must therefore be sought in corrugations of the thin shelly envelope, — stays and buttresses of one sort or another. In shallow-water *Trochidæ* the adult outer lip is never reflected. Strength is secured by the internal thick wall of the shell, reinforced at the aperture by ridges of nacre. In *Turcicula* and *Gaza* of the depths, we have the margin strengthened by recurvature, as, for other reasons, we find it in the equally thin land shells like *Mesodon*, *Bulimus*, or *Cylindrella.* In the *Unio* and *Melania* of fresh-water streams, whose waters from the decay of vegetable matter are overcharged with carbonic acid, we find a dense thin greenish epidermis developed as a protection against erosion. In the depths, where every portion of the shell must be permeated by the surrounding element to equalize the external pressure, and where carbonic acid exerts its usual malign influence on the limy parts of all organisms, we find a strikingly similar protective epidermis developed in most unexpected places. Thus it comes about, that in the Trochi, Pleurotomidæ, and other characteristic abyssal animals, we find those puzzling and remarkable counterparts of land and fresh-water species of totally diverse groups, which have astonished every student of the Mollusca who has seen them.

But it is necessary to close these observations, the fruit of more than eight years' study of these fascinating organisms. I do so with the sincere expression of my appreciation of the kindness and patience with which Prof. Agassiz has seconded all my endeavors, and with hearty thanks to the numerous friends and correspondents to whose courtesy and learning much of such value as this Report may possess is justly due.

INDEX TO PARTS I. AND II.

Names in Italics are those which were first proposed in connection with this Report. When several page numbers follow a name, the number in Italics distinguishes the page on which the name is defined from those on which it is merely cited. A "v." preceding a name indicates that it is only of varietal rank. An asterisk indicates that on the page so marked data are given in relation to the anatomical features of the animal named. Family names and those of higher rank are only indexed when first proposed in this Report.

Abranchiata, II. 436.*
Abra, I. 194, 195, *278;* II. 455.
  æqualis, I. 279.
  lioica, I. 195, *278*, 279.
  longicallis, I. 195, *278.*
Acanthochiton, II. 417.
Acanthoidea, II. 414.
Acanthopleuridæ, II. 416.
Acardo, II. 60.
Aciona, II. 299, 305, 375.
Acirsa, II. 300, 308.
  borealis, II. 307, 308.
  costulata, II. 307.
Aclis, II. 28, 282, *324.*
  egregia, II. 28, *325*, 326.
  lata, II. 28, *324.*
  nucleata, II. 28, *325.*
  supranitida, II. *324*, 325.
Acmæa, II. 342, 343, 345, 346, 409, *410*,* 411, 450.
  albicosta, II. 409.
  antillarum, II. 343.
  Candeana, II. 409, 410.
  confusa, II. 410.
  cubaniana, II. 409.
  elegans, II. 410.
  leucopleura, II. 409.
  melanoleuca, II. 409, 410.*
  melanosticta, II. 409, 410.
  notata, II. 409.
  onychina, II. 409.
  patina, II. 410.*
  v. pulcherrima, II. 409.
  punctulata, II. 409.
  puncturata, II. 409.
Acmæa pustula, II. 409.
  rubella, II. 346.
  spectrum, II. 410.*
  surinamensis, II. 409.
Acmæidæ, II. 436.
Acœtes lupinus, II. 360.
Acrilla, II. 267, 300.
  decussata, II. 312.
Actæon, II. 5, *39*, 455.
  cubensis, II. 40.
  Cumingii, II. 5, *40.*
  Danaida, II. 5, *42.*
  delicatus, II. 5, *41.*
  depressus, II. 40.
  exiguus, II. 42.
  exilis, II. 5, *39.*
  fasciatus, II. 41.
  hebes, II. 41.
  incisus, II. 5, *42.*
  melampoides, II. 5, *41*, 42.
  nitidus, II. *39.*
  Noæ, II. 40.
  ovulum, II. 41.
  perforatus, II. 5, *42.*
  punctostriatus, II. 5, *40.*
  pusillus, II. 5, *39.*
  splendidulus, II. 41.
  tornatilis, II. 39, 41.
  turritus, II. 40.
Acus, II. 8, *62*.*
Acyonæa, II. 299.
Acyonée, II. 299.
Addisonia, II. 30, 343, *344*, 349, 350, 408, 437.
  eccentros, II. 344.

- Addisonia lateralis, II. 30, *344*.*
  - v. *paradoxa*, II. 344.*
- Adeorbis, II. 24, 222, 273, 276, *278*, 359, 360.
  - Beaui, II. 278, 361.
  - bicarinatum, II. 278.
  - cancellatus, II. 361.
  - depressus, II. 298.
  - fragilis, II. 298.
  - liratus, II. 278.
  - naticoides, II. 361.
  - nautiliformis, II. 360.
  - striatus, II. 278.
  - supranitidus, II. 24, *278*, 361.
  - v. Orbignyi, II. 24, *278*.
- Admete, II. 131, 132.
  - nodosa, II. 131.
- Æsopus, II. 17, 187, *193*, 339.
  - chrysalloidea, II. 193.
  - filosus, II. 193.
  - japonicus, II. 193.
  - Metcalfei, II. 17, *194*.
  - Stearnsii, II. 17, *194*.
- *Aforia*, II. 10, *99*.
  - circinata, II. 10, *99*.
  - *hypomela*, II. 10, *99*.
- Alaba, II. 22, *258*.
  - *Adamsii*, II. 22, *258*.
  - *cerithidioides*, II. 22, *258*.
  - melanura, II. 258.
  - tervaricosa, II. 22, *258*.
- Alicia, I. 308.
- Allerya Krebsii, II. 290.
- Alvania, II. 339.
- Amæa, II. 300.
- Amalthea, II. 26, 283, *289*.
  - antiquata, II. 290.
  - barbata, II. 290.
  - *benthophila*, II. 26, *289*.
  - costellata, II. 290.
  - effodiens, II. 290.
  - subrufa, II. 290.
  - tuberculata, II. 290.
- Amaura, II. 333, 339.
- Amcæa, II. 300.
- *Amiculidæ*, II. 416.
- Amoura, II. 333, 339.
  - anguliferens, II. 339.
- Amphidesma cancellata, I. 279.
  - variegata, I. 279.
- Amphiperas, II. 20, *234*.
  - aperta, II. 237.
  - birostris, II. 237.
- Amphiperas canadinensis, II. 235.
  - carolinensis, II. 235, 236.
  - gibbosus, II. 237.*
- Amusium, I. 188, 206, *207*, 208,* 209, 216; II. 433.*
  - *alaskensis*, I. 188, *215*, 218.
  - cancellatum, I. 188, *213*,* 221.
  - Dalli, I. 188, 206,* *209*, 210,* 212; II. 433,* 434,* 435.*
  - fenestratum, I. 211, 213, *221*, 222.
  - *Holmesii*, I. 188, *214*.
  - Hoskynsi, I. 188, *213*, 214, 222.
  - *lucidum*, I. 209, 211, *212*.
  - v. *marmoratum*, I. 188, *212*, 214.
  - meridionale, I. 210, *212*.
  - Mortoni, II. 158, 438.
  - pleuronectes, I. 206,* 207, 208; II. 438.
  - *Pourtalesianum*, I. 188, 210, *211*.
  - *Sayanum*, I. 188, *214*, 215.*
  - squamigerum, I. 215.
  - v. striata, I. 209, 212.
  - v. *striatulum*, I. 188, *212*.
- Amussium, I. 208.
- Amycla chrysalloidea, II. 193.
- Amygdalum, I. 234.
- Anachis, II. 16, *187*, 339.
  - acuta, II. 188.
  - albella, II. 16, *188*.
  - *amphissella*, II. 16, *188*.
  - avara, II. 16, *187*.*
  - catenata, II. 16, *188*.
  - costulata, II. 188.
  - haliæeti, II. 16, *188*.
  - Hotessieriana, II. 16, *188*.
  - iontha, II. 188.
  - obesa, II. 16, *188*, 189.
  - v. ostreicola, II. 16, *188*.
  - pulchella, II. 16, *188*.
  - *Rushii*, II. 188.
  - v. *samanensis*, II. 16, *188*.
  - v. semiplicata, II. 16, *187*.
  - v. similis, II. 16, *187*.
  - v. translirata, II. 16, *187*.
- Anatina, I. 306, 308.
  - papyratia, I. 306.
- Ancistromesus mexicanus, II. 410.*
- *Ancistrosyrinx*, II. 9, *77*, 78.
  - cedonulli, II. 78, 79.
  - columbaria, II. 78.
  - *elegans*, II. 9, *78*, 79.
  - *radiata*, II. 9, *78*, 79.*
- Angaria crassa, II. 360.

Angulus Gouldii, I. 278.
Anomia intustriata, I. 228.
Antalis agilis, II. 418.
Anura Craveni, II. 228.
Ancistrobasis, II. 32, *383*, *384*.
Aphanitoma, II. 98.
Aplacophora, II. 413.
Apollon, II. 223.
  gyrinus, II. 224.
Aporrhais, II. 274.
Arca, I. 190, *240*; II. 433,* 434.*
  Adamsi, I. 191, *243*.
  auriculata, I. 191, *241*.*
  barbadensis, I. 243.
  barbata, I. 191, *244*.
  cælata, I. 243.
  clathrata, I. 242.
  congenita, I. 242.
  v. *Conradiana*, I. 243.
  v. crenulata, I. 240.
  culebrensis, I. 245.
  domingensis, I. 242.
  donaciformis, I. 242.
  ectocomata, I. 191, 233, *243*, 244;* II. 433,* 434,* 435.*
  glacialis, I. 240, 241.
  glomerula, I. 191, 240, *241*.
  gradata, I. 242.
  grenophia, I. 240.
  inæquisculpta, I. 241.
  lactea, I. 243.
  lienosa, I. 191, *242*.
  Listeri, I. 244.
  Noæ, I. *243*; II. 434,* 435.*
  nucleus, I. 245.
  occidentalis, I. 191, 243.
  v. *orbiculata*, I. 190, *240*.
  pectinata, I. 239.
  pectunculoides, I. 190, *240*, 241, 289.
  pectunculus, I. 239.
  pectunculus minor, I. 239.
  polycyma I. 191, *241*.
  profundicola, I. 245.
  pteroessa, I. 245.
  reticulata, I. 191, *242*.
  squamosa, I. 242.
  umbonata, I. 191, *243*.
  undata, I. 238.
Architectonica tricarinata, II. 389.
Arene, II. 32, 386, *387*.
  cruentata, II. 386.
  tricarinata, II. 387.
Argiope antillarum, I. 203.
Argiope Barrettiana, I. 203.
  Schrammi, I. 203.
Argobuccinum, II. 223.
Argonauta cornu, II. 386.
Aspella, II. 18, *206*, 209, 210.
  anceps, II. 18, *207*, 210.
  hastula, II. 18, *207*, 209, 210.
  scalarioides, II. 18, *207*, 210.
  v. lamellosa, II. *207*, 209.
  v. obeliscus, II. 18, *207*.
  v. paupercula, II. 18, *207*, 209.*
Astarte, I. 192, *259*.
  crenata, I. 261.
  v. *globula*, I. 192, *260*.
  lens, I. 260, 261.
  nana, I. 192, *261*.
  Smithii, I. 192, *259*, 261.
  sulcata, I. 259.
Asthenothærus, I. 197, *308*, 309.
  Hemphillii, I. 197, *308*.
  villosior, I. 308.
Astyris, II. 16, 187, *189*.
  amphissella, II. 188.
  annettæ, II. 17.
  diaphana, II. *191*, 192.
  Duclosiana, II. 17, 190, *193*.
  fusiformis, II. 16, *191*.
  Holbollii, II. 191, 192.
  lunata, II. 16, *189*, 193.
  multilineata, II. 16, *190*.
  profundi, II. 17, 191, *192*.
  pura, II. 190.
  Raveneli, II. 16, *190*, 191.
  rosacea, II. 16, 189, 190, *191*, 192.
  Saintpairiana, II. 17, *193*.
  v. strix, II. 17, 193.
  Verrillii, II. 17, 188, *192*.
  zonale, II. 190.
Atopodonta, II. 440.
  coniformis, II. 440.
Atys, II. 6, *54*.
  bathymophila, II. 53.
  caribbæa, II. 54.
  naucum, II. 54.
  Sandersoni, II. 6, *54*.
Aulica, II. 150.
  dubia, II. 151.
Auriculina insculpta, II. 39.
Aurinia, II. 13, 144, 145, 149, *150*, 452.*
  dubia, II. 13, 144, 145, 150, *151*, 152.*
  Gouldiana, II. 13, 144, 145, *154*, 155,* 156.
  mutabilis, II. 150.

Aurinia robusta, II. 13, 144, 145, *153*.
Avicula, I. 190, *233*; II. 374.
    atlantica, I. 190, *233*.
Axinus orbiculatus, I. 267.

Barbatia, I. 244.
Basilissa, II. 32, 268, 274, 368, 373, *383*, 384.
    alta, II. 32, 268, 383, *384*.
    costulata, II. 32, 383, *384*, 385.
  v. *delicatula*, II. 32, *384*.
  v. *depressa*, II. 383, *384*.
  v. oxytoma, II. 384.
    reticulata, II. 385.
    superba, II. 384.
Basterotia, I. 198, *316*.
    corbuloides, I. 316.
    granatina, I. 198, *316*.
    quadrata, I. 316.
Bathymophila, II. 32, *378*.
Bela, II. 81.
    Blakeana, II. 126.
    demersa, II. 128.
    extensa, II. 126.
    filifera, II. 123.
    limacina, II. 106.
Benthobia, II. 12, *131*.
    Tryonii, II. *132*.
Benthodolium, II. 19, 228, *229*.
    abyssorum, II. 229.
Benthonella, II. 25, *281*, 455.
    Fischeri, II. 25, *282*.
    gaza, II. 25, *282*.
    nisonis, II. 25, *283*.
Bifrontia, II. 276.
    Pingeli, II. 276.
    Rochettina, II. 276.
Biplex, II. 223.
    perca, II. 223.
    rosa, II. 223.
Bittium, II. 22, *257*, 266.
    abruptum, II. 257.
    alternatum, II. 22, *257*.*
    gibberulum, II. 258.
    nigrum, II. 257,* 258.
    pallidum, II. 258.
    varium, II. 22, *258*.
    yucatecanum, II. 257, 266.
Bivonia, II. 23, *263*, 264.
    exserta, II. 23, *264*.
Boreotrophon, II. 18, 204, *205*, 209, 210.
    actinophorus, II. 18, 200, *206*.
    aculeatus, II. 18, *205*.
Boreotrophon Dalli, II. 18, *204*.
  v. *lacunellus*, II. 18, *205*.
Borsonia, II. 10, *97*.
    ceroplasta, II. 10, *97*.
    prima, II. 97.
    sericea, II. 97.
Botula, I. 235.
Brocchia, II. 289.
Broderipia, II. 343.
Brugnonia, II. 224.
Buccinidæ, II. 174.
Buccinopsis, II. 176.
Buccinum altile, II. 176.
    ambiguum, II. 184.
    Escheri, II. 176.
    hydrophanum, II. 259.
    integrum, II. 132.
    muriciformis, II. 204.
    niveum, II. 180, 181.
    reticulatum, II. 221.
    sinuatum, II. 72.
    zonale, II. 179.
Buffo, II. 223.
Bufo, II. 223.
Bufonaria, II. 223.
Bulimulus, II. 375.
    acutus, II. 375.
    trifasciatus, II. 375.
Bulimus, II. 456.
Bulla, II. 7, *55*.
    abyssicola, II. 7, *56*, 57.
    acuta, II. 50.
    alba, II. 55.
    bidentata, II. 46.
    biplicata, II. 46.
    clausa, II. 7, *57*.
    conica, II. 49.
    conulus, II. 49.
    eburnea, II. 7, *55*, 57.
    fucicola, II. 50.
    grandis, II. 54.
    Krebsii, II. 7, *56*.
    occidentalis, II. 7, *55*, 56.
    pallida, II. 142.
    pinguicula, II. 56.
    plicata, II. 53.
    punctostriatus, II. 52.
    solida, II. 57.
    striata, II. 56.
    succinea, II. 57.
    turrita, II. 47.
    uniplicata, II. 53.
    utriculus, II. 56.

Bulliopsis integra, II. 132.
Bursa, II. 222.
Bushia, I. 197, *309*.
  elegans, I. 197, *310*;* II. 440.
Byssoarca divaricata, I. 242.

Cadulus, II. 36, 418, *428*, 455.
  acus, II. 37, *432*.
  æqualis, II. 36, *429*.
  Agassizii, II. 37, *430*, 432.
  amiantus, II. 37, *431*.
  Bushii, II. 37, *430*.
  carolinensis, II. 37, *430*.
  cucurbita, II. 37, *431*.
  cylindratus, II. 429.
  diploconus, II. 430.
  gibbus, II. 428, 431.
  gracilis, II. 432.
  incisus, II. 428.
  Jeffreysi, II. 36, *430*.
  lunula, II. 37, *431*.
  minusculus, II. 37, *432*.
  obesus, II. 37, 428, *431*.
  Olivii, II. 430.
  ovulum, II. 428.
  Pandionis, II. 430.
  poculum, II. 36, *429*.
  propinquus, II. 430.
  quadridentatus, II. 36, *428*.
  sauridens, II. 431.
  spectabilis, II. 36, *429*.
  subfusiformis, II. 430, 432.
  vulpidens, II. 431.
  Watsoni, II. 36, *429*.
Cæcum trachea, II. 432.
Calceolina anomala, II. 359.
Calliostoma, II. 31, *363*, 368, 369, 374, 377, 455.
  apicinum, II. 31, *366*.
  asperrimum, II. 31, *373*.
  aurora, II. 31, *366*, 368.
  Bairdii, II. 31, *364*, 367, 371.
  Benedicti, II. 31, *371*.*
  cinctellum, II. 31, *372*.*
  circumcinctum, II. 31, *364*.
  corbis, II. 31, *365*.
  dentiferum, II. 31, *373*.
  echinatum, II. 31, *364*.
  euglyptum, II. 31, *363*.
  granulata, II. 358.
  indiana, II. 31, *368*.
  javanicum, II. 369.
  jujubinum, II. 31, *369*.
Callostoma *orion*, II. 31, *367*.
  v. *Psyche*, II. 31, *364*, 371.
  pulcher, II. 366.
  v. *Rawsoni*, II. 31, *369*.
  roseolum, II. 31, *366*.
  sapidum, II. 31, *364*.
  Sayanum, II. 31, *370*, 371.*
  sericifilum, II. 31, *373*.
  v. tampaënsis, II. 31, 366, *369*.
  tiara, II. 31, *365*, 372.
  tigris, II. 370.
  yucatecanum, II. 31, *370*.
  zonamesta, II. 369.
Callocardia, I. 194, *272*, 273; II. 440.
  Adamsi, I. 273.
  atlantica, I. 272, *273*.
  Leeana, II. 440.
  pacifica, I. 273.
  pilula, I. 273, *274*.
  subquadrata, I. 273.
  venusta, I. 273, *274*, II. 439.
Callogaza, II. 30, *356*.
  superba, II. 354.
  Watsoni, II. 30, *356*, 357.*
Callogonia, II. 440.
  Leeana, II. 440.
Calyptræa, II. 25, 283, *284*.
  Candeana, II. 25, *284*.
  chinensis, II. 284.
  conica, II. 284.
Camptonectes, I. 206, 219, 220.
Cancellaria, II. 12, *129*, 132, 299.
  brevis, II. 131.
  bullata, II. 129.
  Candeana, II. 131.
  Candei, II. 179.
  citharella, II. 100.
  Conradiana, II. 129.
  corrugata, II. 131.
  depressa, II. 129.
  funiculata, II. 130.
  microscopica, II. 131.
  minima, II. 130, 131.
  piscatoria, II. 129.
  reticulata, II. 12, *129*.
  rugosa, II. 129.
  scalarina, II. 131.
  scalatella, II. 130.
  similis, II. 129.
  Smithii, II. 129, 130.
  Stimpsoni, II. 129.
  subangulata, II. 131.
  subangulosa, II. 131.

- Cancellaria tenera, II. 129.
  - tessellata, II. 131.
  - Thomasiana, II. 131.
  - venusta, II. 12, 129.
- Candelabrum, II. 77.
- Capulus, I. 181, II. 25, _286_,* 287.
  - calyptra, II. 287.
  - crystallinus, II. 287.
  - _galea_, II. 25, _288_.*
  - hungaricus, II. 286,* _287_, 289.
  - intortus, II. 25, _288_.
  - obliquus, II. 289.
- Cardiomya, I. 196, 296.
  - _californica_, I. 196, _295_.
  - v. corpulenta, I. 196, _298_.
  - costellata, I. 196.
  - v. curta, I. 196.
  - _perrostrata_, I. 196.
  - striata, I. 196, _298_.
- Cardita, I. 192, _256_.
  - domingensis, I. 192, _256_.
- Cardium, I. 193, 269; II. 434,* 435.*
  - antillarum, II. 439.
  - _ceramidum_, I. 193, _269_;* II. 439.
  - edule, II. 442.
  - haitense, I. 269.
  - hians, II. 443.
  - lævigatum, I. 193, _270_.
  - medium, I. 193, _269_.
  - muricatum, I. 193, _270_.
  - Nicoletii, I. 270.
  - parile, I. 270.
  - _peramabilis_, I. 193, _269_.
  - serratum, I. 193, _270_.
  - _sybariticum_, I. 271.
  - v. _tinctum_, I. 270.
- Careliopsis, II. 29, 333, _338_.
  - styliformis, II. 29, _338_.
- Caricella, II. 147.
  - demissa, II. 144.
- Carinidea, II. 286.
- Cassida penita, II. 221.
- Cassis, II. 20, 228, _231_, 233.
  - cameo, II. 231.
  - flammea, II. 231.
  - inflata, II. 20, _231_.
  - penita, II. 221.
  - testiculus, II. 231.
  - tuberosa, II. 231.
  - vera, II. 221.
- Cerithidea, II. 259.
  - ambigua, II. 259.
  - costata, II. 259.
- Cerithidea scalariformis, II. 259.
  - scalata, II. 259.
  - tenuis, II. 259.
  - turrita, II. 259.
  - varicosa, II. 259.
- Cerithiella metula, II. 251, 256.
- Cerithioderma prima, II. 269.
- Cerithiopsis, II. 22, 242, 250, _251_, 256.
  - abrupta, II. 22, 256, _257_.
  - _acontium_, II. 22, _256_.
  - arctica, II. 254.
  - angustissimum, II. 257.
  - _crystallina_, II. 22, _254_,* 255.
  - Emersonii, II. 253.*
  - Greenii, II. 251, 252.
  - iota, II. 252.
  - _Martensii_, II. 22, 254, _255_.
  - _matara_, II. 22, _255_.
  - metaxæ, II. 22, _256_, 257.
  - minima, II. 251, 252.
  - punctatum, II. 252.
  - _Sigsbeana_, II. 22, _254_.
  - subulata, II. 22, _252_, 253.*
  - v. _tæniolata_, II. 22, _256_.
  - terebellum, II. 250.
  - terebralis, II. 250.
  - tubercularis, II. 251, 252, 253, 254.
- Cerithium, II. 258.
  - adversum, II. 243.
  - algicola, II. 259.
  - antillarum, II. 259.
  - atratum, II. 259.
  - decoratum, II. 244.
  - eburneum, II. 259.
  - elegans, II. 252.
  - Emersonii, II. 252.
  - ferrugineum, II. 259.
  - floridanum, II. 258.
  - inflata, II. 249.
  - iota, II. 252.
  - literatum, II. 259.
  - metula, II. 252.
  - minimum, II. 259.
  - muscarum, II. 259.
  - nigrescens, II. 259.
  - nigrocinctum, II. 243.
  - perversum, II. 243.
  - punctatum, II. 252, 253.
  - Rawsoni, II. 259.
  - Sagræ, II. 259.
  - Sayi, II. 257.
  - semiferrugineum, II. 259.
  - septemstriatum, II. 259.

Cerithium subulatum, II. 252.
  terebellum, II. 250.
  terebrale, II. 250.
  trilineatum, II. 250, 251.
  uncinatum, II. 259.
  variabile, II. 259.
  versicolor, II. 259.
Cetoconcha, I. 195, *280*,* 281,* 282, 284, 288; II. 437,* 441,* 444,* 449,* 450,* 452.*
  albida, I. 281, *282*, 283.
  bulla, I. 281, *283*;* II. 440,* 446,* 447.*
  elongata, I. 280, 281, *283*.*
  margarita, I. 281, *284*;* II. 446,* 447.*
  nitida, I. 281.
  Sarsii, II. 447.
  tornata, I. 281, 282.
Cetomya, II. 446,* 448,* 452.*
  albida, II. 448.*
  elongata, II. 440,* 447.*
  tornata, II. 448.
Chætodermida, II. 413.
Chama, I. 193, *268*.
  lactuca, I. 193, *268*.
  macrophylla, I. 268.
  sarda, I. 193, *269*.
Chemnitzia, II. 335.
  flavocincta, II. 336.
  interrupta, II. 337.
  pusilla, II. 337.
  speira, II. 336.
Chicoreus, II. 17, *197*.
  Hidalgoi, II. 17, *198*.
Chilocyclus, II. 301.
Chione, I. 194, *276*, II. 435.*
  cancellata, I. 194.
  pygmæa, I. 194.
Chitonacea, II. 413.
Chiton eocenensis, II. 414.
  limaciformis, II. 415.
  productus, II. 415.
  purpurascens, II. 416.
  sanguineus, II. 415.
  squamosus, II. 414.
  tuberculosus, II. 414.
Chlamydochiton, II. 417.
Choristes, II. 394.
Chromodoris punctilucens, II. 453.
  scabriusculus, II. 453.
  sycilla, II. 453.
Chrysodomus, II. 15, *174*, 179, 188.
  Mohni, II. 176.
Chrysodomus ventricosus, II. 175.
Cinctella, II. 250.
  trilineata, II. 250.
Cingula aculeus, II. 280, 339.
  apicina, II. 282.
Circe, I. 261, 262,* 263, 276.
  bermudensis, I. 263.
  cerina, I. 192, *263*.
  divaricata, I. 262.
  metastriata, I. 263.
  scripta, I. 262.
Circulus formosissimus, II. 387.
Cirostrema, II. 300.
Cirsotrema, II. 300, 319.
Cistella, I. 187, *202*.
  Barrettiana, I. 187, *203*.
  lutea, I. 187, *203*.
  rubrotincta, I. 203.
  Schrammi, I. 187, *203*.
Cithara, II. 100.
Cithna cingulata, II. 277.
Clathrella, II. 24, *278*.
  naticoides, II. 24, *278*.
Clathrus, II. 299, 300.
Clathurella, II. 98.
  cala, II. 119.
  chariessa, II. 122.
  circumvoluta, II. 84.
  hormophora, II. 106.
  quadrata, II. 113.
Clavus ebur, II. 89.
Clidiophora, I. 197, *311*, 312.
  carolinensis, I. 197, *311*.
  Gouldiana, I. 197, *312*.
  trilineata, I. 197, *311*.
Clionella, II. 118.
  aglaophanes, II. 93.
  amblia, II. 92.
  exsculpta, II. 117.
Cocculina, I. 181; II. 30, 343, 344, *345*, 346,* 349, 408, 412, 455.
  adunca, II. 345.
  angulata, II. 345, 346.*
  Beanii, II. 30, 346, *347*,* 348.
  conica, II. 346.
  corrugata, II. 345.
  Dalli, II. 346.
  galeola, II. 346.
  leptalea, II. 346.
  pusilla, II. 345.
  Rathbuni, II. 30, 346, *347*,* 348.
  spinigera, II. 30, 345, 346,* *348*,* 349.*

Coccopygia, II. 30, *348*, 350.
angulata, II. 350.
Cochlearia, II. 301, 306.
carinata, II. 301.
Cochliolepis, II. 31, *360*.
parasitica, II. 31, *360*, 361, 392.
striata, II. 31, *360*, 361.
Cochlis, II. 26, *292*.
pusilla, II. 296.
Coleophysis, II. 6, *44*, 45.
perplicatus, II. 6, *45*, 49.
Collonia, II. 351.
induta, II. 352.
marginata, II. 351.
Colubraria, II. 19, *225*.
lanceolata, II. 19, *225*.
reticulata, II. 226.
Swiftii, II. 19, *225*.
testacea, II. 226.
Columbarium, II. 77, 78.
pagoda, II. 78.
Columbella, II. 16, *186*, 455.
ambigua, II. 181.
amphissella, II. 188.
avara, II. 187.
cancellata, II. 188.
diaphana, II. 192.
dicomata, II. 189.
dissimilis, II. 189.
Duclosiana, II. 190, 193.
Gouldiana, II. 189.
Gouldii, II. 187.
idalina, II. 189.
Lafresnayei, II. 193.
lunata, II. 189, 193.
mercatoria, II. 16, 186.
moleculina, II. 189.
nivea, II. 190.
ornata, II. 188.
ostreicola, II. 188.
ovulata, II. 194.
peculiaris, II. 194.
rosacea, II. 192.
rustica, II. 186.
rusticoides, II. 16, *186*.
Saintpairiana, II. 192, 193.
similis, II. 182.
spizantha, II. 190.
strix, II. 192, 193.
subacta, II. 193.
terpsichore, II. 187.
translirata, II. 182.
Verrillii, II. 192.
Columbella Wheatleyi, II. 189.
zonali, II, 190.
Colus exilis, II. 166.
Compsopleura, II. 300, 301.
trinodosa, II. 300.
Conidea, II. 187, *194*.
Conidia ovulata, II. 194.
Conomitra, II. 14, *163*.
angulata, II. 163.
Blakeana, II. 14, *163*.
fusoides, II. 163.
v. *lævior*, II. 14, *164*.
minima, II. 164.
staminea, II. 163.
vicksburgensis, II. 163.
Constantia, II. 300, 301.
elegans, II. 300, 301.
Conus, II. 8, *67*.
achatinus, II. 70.
Agassizii, I., Expl. Pl. IX.; II. 8, *68*.
amphiurgus, II. 8, *70*.
armillatus, II. 68.
breviculus, II. 68.
candidus, II. 68.
cedonulli, II. 8, *67*.
centurio, II. 8, *69*, 70.
Cleryi, II. 69.
columba, II. 70.
daucus, II. 8, *69*, 70.
Delesserti, II. 70, 158.
flavescens, II. 8, *70*.
floridanus, II. 68, *70*, 154.
floridensis, II. 154.
gloria-maris, II. 293.
gracilis, II. 67.
leoninus, II. 68.
magellanicus, II. 70.
Mazei, II. 8, *67*, 154.
Melvilli, II. 70.
mus, II. 70.
nebulosus, II. 70.
ochraceus, II. 68.
Orbignyi, II. 67.
papillosus, II. 70.
Pealii, II. 8, *68*, 70.
planicostatus, II. 67.
proteus, II. 8, *68*.
pusio, II. 70.
pygmæus, II. 68, 70.
Reevei, II. 69.
roseo-tinctus, II. 70.
spurius, II. 68.
Stearnsii, II. 68.

May 28, 1889.

Conus subcarinatus, II. 70.
  verrucosus, II. 69, 70.
  Villepini, II. 8, *69.*
Coralliophila, II. 19, 205, *217.*
  abbreviata, II. 219.
  bracteata, II. 19, 218, *219.*
  Deburghiæ, II. 19, *218.**
  fusiformis, II. 218.
  galea, II. 19, 218, *219.*
  lacerata, II. 219.
  lactuca, II. 19, *220.*
  lamellosa, II. 219.
  Lintoni, II. 219.
  madreporarum, II. 217, 218.
  spinosa, II. 218.
Coralliophora, II. 217.
Corbula, I. 198, *313.*
  Barrattiana, I. 198, *313*, 316.
  Blandiana, I. 314.
  Chittyana, I. 198, *316.*
  costellata, I. 297.
  cubaniana, I. 198, *313.*
  cymella, I. 198, *315.*
  Dietziana, I. 198, *314*, 316.
  disparilis, I. 198, *314.*
  granulata, I. 281.
  Kjaeriana, I. 198, *316.*
  Knoxiana, I. 313.
  Krebsiana, I. 198, *315.*
  nucleus, I. 314.
  oniscus, I. 314.
  operculata, I. *314*, 315, 316.
  parsura, I. 314.
  Philippii, I. 314.
  quadrata, I. 316.
  Swiftiana, I. 198, *314*, 316.
Cordieria, II. 10, *98*, 162.
  Rouaultii, II. 10, *98.*
Corimya, I. 309.
Costellaria, II. 159, 160.
Crenella, I. 190, *235*, 287.
  decussata, I. 190, *235*, 287.
Crepidula, II. 25, *284*,* 286, 288, 289.
  aculeata, II. 25, 285, *286.*
  adunca, II. 285.*
  convexa, II. 286.
  fornicata, II. 286.
  glauca, II. 286.
  navicula, II. 286.
  protea, II. 25, *285.*
  unguiformis, II. 61, 285.
Crossea, II. 300, 301.
  miranda, II. 301.
Crucibulum, II. 25, 283, *284.*
  auricula, II. 25, *284.*
  imbricatum, II. 284.
  planatum, II. 284.
Crania, I. 188, *205.*
  Pourtalesii, I. 188, *205.*
Cranopsis, II. 34, 341,* 345, 349, 403, *404* 405, 406.
  asturiana, II. 34, 344, 350, *404*,* 405, 406, 408.
  erecta, II. 34, *405.*
  granulata, II. 403.
Craspedotus, II. 374.
Crassatella antillarum, I. 256.
  floridana, I. 192, *256*, 257.
  guadalupensis, I. 259.
  mactracea, I. 257, 258.
  martinicensis, I. 259.
  nana, I. 258.
  parva, I. 259.
  undulata, I. 257.
Crassispira, II. 95.
Cremides, II. 34, *407.*
Crucibulum striatum, II. 25, *284.*
Crypta, II. 286.
Cryptaxis, II. 54.
Cryptodon, I. 193, *267* ; II. 438.*
  flexuosus, I. 193, *267.*
  obesus, I. 267, 268.
  orbiculatus, I. 193, *267.*
  pyriformis, I. 193, *267.*
Cryptoplacidæ, II. 416.
Cumia, II. 225.
Cumingia, I. 195, *279.*
  tellinoides, I. 195, *279.*
Cuspidaria, I. 196, 280, *292*, 293,* *294* ; II. 437,* 441,* 447,* 449,* 450,* 452.*
  arctica, I. 294 ; II. 444.
  arcuata, I. 196, 294, *296.*
  californica, I. 196, *296.*
  contracta, I. 294.
  corpulenta, I. 298.
  costata, I. 296.
  costellata, I. *297*, 298.
  curta, I. 298.
  cuspidata, I. 293.
  exigua, I. 294.
  glacialis, I. 294, 303*; II. 444.*
  Jeffreysi, I. 196, 294, *295.*
  lamellosa, I. 294.
  limatula, I. 294.
  microrhina, I. 196, *295* ; II. 440.
  multicostata, I. 296.

Cuspidaria obesa, I. 196, *295*, 303.*
  ornatissima, I. 296.
  patagonica, II. 443,* 445.
  perrostrata, I. 196, *296*.
  rostrata, I. 196, *294*, 295 ; II. 444.*
  striata, I. 298.
Cuvieria, II. 418.
Cyclophorus, II. 304, *305*.
Cycloscala, II. 316.
  Dunkeriana, II. 315.
Cyclostoma, II. 299, 303, 304, 305.
  elegans, II. 305.
Cyclostrema, II. 33, 273, 359, 378, 386, *393*.
  affine, II. 393.
  bicarinatus, II. 278.
  cancellata, II. 361.
  cistronium, II. 33, *394*.
  Dalli, II. 393.
  diaphanum, II. 393.
  fulgidum, II. 393.
  granulum, II. 33, *395*.
  limatum, II. 33, *395*.
 v. ornatum, II. 393.
  pompholyx, II. 33, *394*.
  Schrammi, II. 387.
  trochoides, II. 393.
  turbinum, II. 33, *393*.
  Verreauxi, II. 394.
Cylichna, II. 6, *54*.
  alba, II. 54, 55.
  Auberi, II. 55.
  biplicata, II. 46.
  conulus, II. 46, 49, 50.
  cylindracea, II. 55.
  Dalli, II. 47.
  Hoernesi, II. 49.
  Krebsii, II. 55.
  lineata, II. 55.
  marmorata, II. 51.
  obesiuscula, II. 49.
  occulta, II. 55.
  oryza, II. 46.
  ovata, II. 46, 49, 50.
  umbilicata, II. 55.
  Verrillii, II. 6, *54*.
Cylichnella, II. 6, *45*, 46.
  bidentata, II. 6, 45, *46*.
  biplicata, II. 45.
  oryza, II. 45.
  ovum-lacerti, II. 45.
Cylindrella, II. 456.
Cymatosyrinx, II. 10, *95*.
Cymba, II. 151.
Cymbiola, II. 148.
  brasiliana, II. 156.
Cymbium, II. 148.
Cypræa, II. 21, 173, 232, 234, *239*, 286,* 287.
  Aubryana, II. 239.
  bicallosa, II. 239.
  cervus, II. 239.
  cinerea, II. 21, *239*.
  exanthema, II. 239.
  flaveola, II. 239.
  lurida, II. 239.
  moneta, II. 239.
  mus, II. 239.
  nebulosa, II. 239.
  picta, II. 239.
  spurca, II. 239.
  stercoraria, II. 239.
Cypræactæon, II. 42.
Cypricardia isocardioides, I. 271.
Cyprina, II. 328.
Cyprinus, II. 328.
Cythara, II. 10, 99, *100*.
  astricta, II. 100.
  balteata, II. 100.
  Bartlettii, II. 10, *101*.
  biconica, II. 100.
  citharella, II. 100.
  cymella, II. 10, *101*.
  funiculata, II. 102.
  striata, II. 99, 100.
Cytherea, I. 194, *275*.
  albida, I. 275 ; II. 439.
  hebræa, I. *275*.
  Sayana, I. 275.
  vesica, I. *275*.

Dalium, II. 20, 177, *230*, 231.
  solidum, II. 20, *230*.
Daphnella, II. 10, 99, *102*, 106, 107.
  atrostyla, II. 111.
  calyx, II. 10, *107*.
  corbicula, II. 10, *103*.
  elata, II. 10, *105*.
  hyperlissa, II. 10, *108*.
  leucophlegma, I., Expl. Pl. IX. ; II. 10, *102*.
  limacina, I., Expl. Pl. IX. ; II. 10, 99, 102, *106*, 456.
  lymnæiformis, II. 99, 102, 105.
  monoceros, II. 117.
  morra, II. 10, *105*.
  pompholyx, II. 10, *104*.

Daphnella reticulosa, II. 10, *103*, 104.
  retifera, II. 10, *105*.
  sofia, II. 10, *107*, 108.
Daronia, II. 386.
Defrancia chariessa, II. 122.
  chyta, II. 115.
  circumvoluta, II. 84.
  formosa, II. 119, 120.
  hormophora, II. 106.
  perpauxilla, II. 115.
  streptophora, II. 126.
Delphinula, II. 299, 304, 387.
  cancellata, II. 385.
  laxa, II. 277, 386.
  marginata, II. 351.
  nitida, II. 386.
  tuberculata, II. 387.
  tuberculosa, II. 387.
Dentalium, I. 185; II. 36, *418*,* 420,* 455.
  aculeatum, II. 423.
  acutissimum, II. 419.
  agile, II. 36, *418*.
  antillarum, II. 36, *421*.
  calamus, II. 36, *421*.
  callipeplum, II. 36, *419*, 420.
  callithrix, II. 36, *427*.
  candidum, II. 36, *422*.
  capillosum, II. 36, *425*.
  carduus, II. 36, *423*.
  ceras, II. 36, *425*.
  ceratum, II. 36, *424*.
  compressum, II. 36, *426*.
  didymum, II. 428.
  disparile, II. 36, *424*.
  ensiculus, II. 36, *428*.
  entalis, II. 418.
  filum, II. 36, *419*.
  Gouldii, II. 36, *424*, 425.
  gracile, II. 419.
  hexagonum, II. 425.
  laqueatum, II. 36, *426*.
  leptum, II. 36, 420, *421*.
  longistrorsum, II. 419.
  matara, II. 36, *420*.
  nebulosum, II. 423.
  obscurum, II. 425.
  octagonum, II. 426.
  ophiodon, II. 36, *427*.
  panormitanum, II. 424.
  paucicostatum, II. 426.
  perlongum, II. 36, *419*.
  rubescens, II. 420.
  sericatum, II. 36, *423*.
Dentalium Sigsbeanum, II. 428.
  solidum, II. 422.
  taphrium, II. 36, *422*, 423.
Dentistyla, II. 373, *374*.
Dermatomya, II. 448,* *452*.
  mactroides, II. 448.*
Diaphana conulus, II. 49.
  gemma, II. 46, 55.
Diastoma, II. 22, *258*.
Dicranobranchia, II. 341.*
Dillwynella, II. 31, 360, *362*.
  modesta, II. 31, *362*.
Diloma, II. 362.
Dimya, I. 172, 173, 206, 210, *227*, 228;* II. 291, 433.*
  argentea, I. 189, *228*, 229,* 230,* 231;* II. 433,* 434.*
  Deshayesiana, I. 227, *228*, 231.
  tenuiplicata, I. 231.
Dimyodon, I. 233.
Dione, I. 194, *275*.
  albida, I. 194.
  hebræa, I. 194.
  vesica, I. 194.
Diplodonta, I. 193, *263*.
  pilula, I. 274.
  turgida, I. 193, *263*.
  venezuelensis, I. 193, *263*.
Dipsaccus, II. 173.
Dipsas plicatus, II. 375.
Discohelix, II. 276.
Discopsis, II. 360.
Dispotæa, II. 25, *284*.
Distorsio, II. 220.
  cancellinus, II. 221.
  clathrata, II. 221.
  clatrata, II. 221.
  occidentalis, II. 221.
  reticulata, II. 221.
Distorta, II. 220.
  acuta, II. 221.
Distortrix, II. 19, *220*, 221, 222.
  v. clathrata, II. 19, *222*.
  reticulata, II. 19, *221*.
  v. reticulata, II. 19, *222*.
Docoglossa, II. 436.
Dolichotoma, II. 9, *80*.
Doliopsis, II. *232*, 233.
Dolium, II. 20, 228, 230, 231, *232*.
  antillarum, II. 232.
  Bairdii, II. 232.
  Crosseanum, II. 232, 233.
  galea, II. 232.

Dolium pennatum, II. 232.
  perdix, II. 232.
  plumatum, II. 232.
Dolophanes, II. 24, 269, *270*.
  capula, II. 270.
  columbella, II. 24, *271*.
  Gabbi, II. 24, 102, *270*, 271.
  melanioides, II. 270, 271.
Dozia, I. 257.
  lenticularis, I. 257.
Drillia, II. 9, *82*, 242, 455.
  acestra, II. 9, *87*.
v. *acloneta*, II. 9, *92*.
  acrybia, II. 9, *88*.
  æpynota, II. 10, *96*.
  albicoma, II. 9, *83*.
  alesidota, II. 9, *84*.
  amblia, II. 92.
v. *canna*, II. 9, *86*, 87.
v. *carminura*, II. 9, *91*.
  centimata, II. 10, *95*.
v. *cestrota*, II. 9, *92*.
  coccinata, II. 9, *90*.
  Dalli, II. 9, *92*, 93.
  detecta, II. 9, *84*.
  ebur, II. 9, *89*, 96.
  eucosmia, II. 9, *86*, 87.
  elusiva, II. 115.
  exasperata, II. 88.
  exsculpta, II. 117.
  fucata, II. 9, *89*, 90.
  gratula, II. 110.
  haliostrephis, II. 9, *86*.
  havanensis, II. 9, *93*.
  incilis, II. 110.
  Kennicottii, II. 118.
  leucomata, II. 120.
  limonitella, II. 111.
  lissotropis, II. 9, *91*, 93.
  lithocolleta, II. 9, *95*.
v. *macilenta*, II. 9, *85*.
  Moseri, II. 10, *97*.
  nucleata, II. 9, *92*, 93.
  oleacina, II. 9, *94*.
  ostrearum, II. 9, *82*, 83.
  pagoda, II. 99.
  pagodula, II. 9, *90*.
  pallida, II. 95.
v. *pentagonalis*, II. 9, *90*.
  peripla, II. 115.
  pharcida, II. 9, *88*.
  polytorta, II. 9, *85*.
  premorra, II. 9, 93.
Drillia serga, II. 114.
  Simpsoni, II. 9, *91*.
  smirna, II. 9, 94.
  subsida, II. 118.
  thea, II. 9, *91*.
  tristicha, II. 9, *88*.
  Tryonii, II. 9, *83*.
  Verrillii, II. 9, 92, *93*.

Eburneopecten, I. 219.
Eglisia, II. 301.
Emarginula, II. 34, 342, 405, *406*, 407, 437.*
  cancellata, II. 34, *406*.
  compressa, II. 34, *406*.
  Rollandi, II. 407.
Embla, I. 280.
Enæta, II. 163.
Engina rosea, II. 217.
Entemnotrochus, II. 34, *400*.
Eochitonia, II. 35, *413*, 414.
Eopsephæa, II. 144, 150.
  muricina, II. 150.
Epidromus, II. 225.
  Swiftii, II. 226.
Episcynia, II. 273, 392.
Epitonium, II. 299, 303.
Ethalia, II. 31, 359, 360, *361*.
  anomala, II. 361.
  crassa, II. 360.
  diaphana, II. 361.
  multistriata, II. 361.
  reclusa, II. 31, *361*.
  solida, II. 31, 361, *362*.
  suppressa, II. 31, 361, *362*.
Erato, II. 21, *241*.
  cypræoides, II. 241.
  hæmatina, II. 138.
  Maugeriæ, II. 21, 241.
  vitellina, II. 242.
Eriphyla, I. 257.
  gregaria, I. 257, 258.
  mactracea, I. 258.
  parva, I. 192.
  umbonata, I. 257, 258.
Eriphylopsis gregaria, I. 257, 258.
Ervilia, I. 195, *279*.
  nitens, I. 195, *279*.
Erycina labradorica, II. 308.
Eubela, II. 10, 99, *102*, 106.
Eucasta, II. 31, *368*.
Eucharis, I. 316.
Eucheilodon, II. 98, 108.

Euchelus, II. 32, 374, *382.*
    guttarosea, II. 32, *382.*
    punctiger, II. 383.
Euciroa, I. 196, *286,* 291.
Eucithara, II. 100.
Eucosmia, II. 30, *351.*
Eudesia, I. 187, *202.*
    floridana, I. 187, *202;* II., Pl. XXXIX.
Eudolium, II. 20, *232.*
    Crosseanum, II. 20, *232.*
    Verrillii, II. 20, *233.*
Eulima, II. 28, *326,* 327, 328.
    acuta, II. 328.
    affinis, II. 327.
    arcuata, II. 28, *328.*
    bifasciata, II. 328.
    bilineata, II. 329.
    Carolii, II. 327.
    conoidea, II. 327.
    curva, II. 328.
    distorta, II. 328.
    elongata, II. 28, 328.
    fulvocincta, II. 329.
    fusus, II. 329.
    gibba, II. 327.
    gracilis, II. 327.
    Hemphillii, II. 329.
    intermedia, II. 28, *327.*
    interrupta, II. 330.
    jamaicensis, II. 28, *327.*
    major, II. 326, 328.
    oleacea, II. 327.
    polita, II. 326.
    pusilla, II. 327.
    splendidula, II. 329.
    stenostoma, II. 328.
    subcarinata, II. 327.
    unifasciata, II. 338.
Eulimella, II. 29, *338.*
    resticula, II. 29, *338.*
    Scillæ, II. 338.
    Smithii, II. 334, 338.
    unifasciata, II. 29, *338.*
Eumargarita, II. 374.
Eumeta, II. 22, *252.*
    costulata, II. 254.
    subulata, II. *252.*
Eunaticina, II. 26, *297.*
    carolinensis, II. 26, *297.*
Eupleura, II. 17, *202,* 215.
    caudata, II. 17, *202,* 203.*
    clathrata, II. *203.*
    muriciformis, II. *203,* 204.
Eupleura Stimpsonii, II. 17, *204.*
Euplica, II. 16, *187.*
    turturina, II. 16, *187.*
Euryta, II. 7, *62.*
Eutrochus, II. 31, *369,* 374.
    cinctellus, II. 372.
Eutropia, II. 302.

Fasciolaria, II. 14, *172,* 173, 174.
    distans, II. 14, *172,* 173.
    gracilentis, II. 172.
    tulipa, II. 172.
Fasciolariidæ, II. *165.*
Favartia, II. 18, 209, *210.*
    cellulosa, II. 18, *210,* 211.
    intermedia, II. 18, *211.*
    levicula, II. 18, *211.*
Fissurella, II. 34, 342, *407,* 408.
    alternata, II. 34, *407.*
    cayennensis, II. 409.
    Dysoni, II. 407.
    fumata, II. 407.
    larva, II. 407.
    limatula, II. 409.
    minuta, II. 409.
  v. *Sayi,* II. *407.*
Fissurellidea, II. 34, *409.*
    fasciata, II. 409.
    limatula, II. 34, *409.*
Fissurisepta, II. 34, *404.*
    rostrata, II. 404.
    triangulata, II. 34, *404.*
Fluxina, II. 24, *273,* 274, 455.
    brunnea, II. 24, *273.*
    discula, II. 24, *273.*
Forskälia, II. 368.
    declivis, II. 357, 368.
Fossarus, II. 24, *272,* 278.
    ambiguus, II. 272.
    Crossei, II. 298.
    depressus, II. 278, 279, 298.
    elegans, II. 272.
    fragilis, II. 278.
    latericeus, II. 272.
    naticoides, II. 278.
    Orbignyi, II. 272.
    Petitiana, II. 298.
    pusillus, II. 272.
    reticulatus, II. 278.
    Schrammi, II. 387.
    sulcatus, II. 272.
    tuberculatus, II. 387.
Fulgoraria, II. 148.

Fulvia, I. 269.
  modesta, I. 270.
Funis, II. 300, 301, 306.
  elongatus, II. 301.
Fusus, II. 14, *165*, 174, 212, 213, 214, 455.
  abyssorum, II. 174.
  æpynotus, II. 14, *169*, 170.
  albidus, II. 204.
  alcimus, II. 14, *170*.
  amiantus, II. 14, *169*.
  amphiurgus, II. 14, *171*.
  antiquus, II. 174.
  benthalis, II. 14, *168*.
  Bocagei, II. 170.
  caloosaensis, II. 167.
  carolinensis, II. 170.
  ceramidus, II. 14, *171*.
  closter, II. 14, 165, *168*.
  colus, II. 168.
  Couei, II. 14, 165, *167*.
  Dupetit-thouarsi, II. 168.
  eucosmius, II. 14, *167*.
  gradatus, II. 165.
  halistreptus, II. 14, *168*.*
  Hartvigii, II. 165.
  lamellosus, II. 170.
  limbatus, II. 165, 175.
  minor, II. 187.
  multangulus, II. 165, 213.
  muricoides, II. 165.
  nitens, II. 165.
  perrugatus, II. 166, 214.
  Pfeifferi, II. 214.
  pulchellus, II. 172, 175.
  rostratus, II. 170.
 v. *Rushii*, II. 14, *170*.
  Schrammi, II. 165, 168.
  sinistralis, II. 165.
  tenuiliratus, II. 165, 168.
  tessellatus, II. 151.
  timessus, II. 14, *166*, 167.
  turriculus, II. 167.

Gadinia, II. 289, 437.*
  excentrica, II. 344.
  lateralis, II. 344.
Galeodea, II. 20, 231
  Coronadoi, II. 20, *231*.
Galerus, II. 284.
  Candeanus, II. 284.
  parvulus, II. 284.
Gastroplax, II. 59.
Gastropteron, II. 7, *59*.
Gastropteron Meckelii, II. 59.
Gaza, II. 30, *354*, 355,* 356, 357, 358, 456.
  dædala, II. 354, 355, 356.
  Fischeri, II. 30, *355*, 356.*
  Rathbuni, II. 354.
  superba, II. 30, *354*, 355,* 356.
Gegania, II. 23, 266, *268*.
  Jeffreysi, II. 23, *268*.
  pinguis, II. 268.
Genota, II. 9, *79*, 82, 119.
  atractoides, II. 82.
  didyma, II. 79.
  mitrella, II. 9, *79*.
  mitriformis, II. 82.
  papalis, II. 82.
  viabrunnea, II. 9, *80*, 81.*
Gibberula, II. 13, 136, *143*.
  lachrimula, II. 142.
  minuta, II. 13, 143.
Gibbula, II. 368.
  divaricata, II. 358.
Glabella elata, II. 139.
Globiconcha ovula, II. 42.
Glyphis, II. 34, *408*.
  barbadensis, II. 409.
  fluviana, II. 34, *408*.*
Glyphostoma, II. 10, 98, 99, *108*.
  dentifera, II. 10, 99, *108*.
  Gabbii, II. 10, *108*, 111.
  gratula, II. 10, *110*.
 v. incile, II. *110*.
  phalera, II. 10, *110*.
Gottoina, II. 24, 272.
  bella, II. 24, *272*.
  compacta, II. 24, *273*.
Gouldia, I. 192, 257, *261*, 262.*
  bermudensis, I. 263.
  cerina, I. 262, *263*.
Granigyra, II. 33, *395*.
Gymnobela, II. 11, 99, 123, *126*.
 v. agria, II. 127.
  Blakeana, II. 126.
  brevis, II. 126.
  curta, II. 99.
  engonia, II. 122, 126.
  extensa, II. 126.
  Lottæ, II. 126.
  Malmii, II. 127.
  tornata, II. 127.
Gymnoglossa, II. 28, *326*.
Gyrineum, II. 19, 208, *222*, 223.
  affine, II. 19, *224*.
 v. cubanianum, II. 19, *224*.

Gyrodes, II. 26, *298*.
  crenata, II. 298.
  depressa, II. 26, *298*.

Haliotis, II. 33, *395*.
  Pourtalesii, II. 33, *395*.
Haliris, I. 196, *287*, 291.
  Fischeriana, I. 196, *291*.
Haloceras, II. 24, *277*.
Halonympha, I. 197, 301.
  claviculata, I. 197, *301*.
Haminea, II. 7, *57*.
  antillarum, II. 57.
  cerina, II. 57.
  elegans, II. 57.
  Guildingi, II. 57.
  glabra, II. 57.
  guadeloupensis, II. 57.
  Petitii, II. 57.
  solitaria, II. 57.
  succinea, II. 7, *57*.
Hanleyia, II. 35, *415*.
  tropicalis, II. 35, *415*.
Harpa, II. 100.
Harpula, II. 148.
Hastula, II. 8, *62*.
Haustator, II. 23, *265*.
Helicina, II. 341, 342, 345, 358.
  orbiculata, II. 342.
Helix sulfurea, II. 232.
Hemipecten, I. 206.
Hindsia, II. 180, 181.
Hinnites, I. 189, 206, *223*.
  Adamsi, I. 189, *223*.
Hippagus, I. 285, 286, *287*.
  acuticostatus, I. 288.
Hipponyx, II. 287, *289*.
  crystallinus, II. 287.
  Danieli, II. 287.
Holopella, II. 301, 306.
Homalaxis, II. 276.
Homalaxon, II. 276.
Homalopoma, II. 352.
Hoplopteron, II. 301, 306, 317.
  Terquemi, II. 301.
Hyalopatina, II. 7, *61*.
  Rushii, II. 7, *61*.
Hyalorisia, II. 25, *288*.

Ianthoscala, II. 300, 311.
Ilaira, II. 276, 386.
Ilyanassa obsoleta, II. 184.
Inella, II. 21, 242, *245*.
Infundibulum, II. 286.
  Candeanum, II. 284.
Iphigenia, I. 285.
Isapis, II. 278.
  anomala, II. 272.
Ischnochiton, II. 35, *415*.
  limaciformis, II. 35, *415*, 416.
  multicostatus, II. 415.
Ischnochitonidæ, II. *415*.
Ischnoidea, II. 414.
Isocardia, I. 194, *271*, 275.
  cytherioides, II. 439.

Jaminia Dupontii, II. 339.
Janacus, II. 25, *285*.
Janira, I. 188, 206, *207*.
  hemicyclica, I. 188, *207*, 222; II. *434*,* 435.
Janthoscala, II. 300.

Katherina, II. 416, 417.
Kellia suborbicularis, I. 273.
Kelliella, I. 272.
  miliaris, I. 272.
Kennerlia, I. 197.
  Bushiana, I. 197, *312*.
  glacialis, I. 311.
Krebsia, II. 25, *288*.

Lachesis minima, II. 105.
Lævicordia, I. 288.
Lagena, II. 173, 230.
Lambidium, II. 20, *231*.
  oniscus, II. 20, *231*.
  strombiformis, II. 231.
Lamellaria, II. 27, *299*.
  Rangii, II. 27, *299*.
Lampusia, II. 19, *226*.
  chlorostoma, II. 19, *226*.
  gracile, II. 19, *227*.
  pharcida, II. 19, *227*.
  pileare, II. 19, *227*.
Latiaxis, II. 217.
  cariniferus, II. 218.
  Deburghiæ, II. 218.
  elegans, II. 218.
  Maweæ, II. 217.
Latirus, II. 15, *173*, 213.
  brevicaudatus, II. 174.
  cayohuesonicus, II. 174.
  cinguliferus, II. 15, *173*.
  contemptus, II. 174.
  fastigium, II. 174.

Latirus infundibulum, II. 174.
maderensis, II. 174.
multangulus, II. 173.
Lavignon antillarum, I. 279.
Petitiana, I. 279.
Laxispira, II. 386, *387*.
laxa, II. 386.
nitida, II. 386, *387*.
Leda, I. 191, *249*, 253; II. 455.
acuta, I. 191, 250, *251*, 252; II. 438.
Bushiana, I. 192, *250*, 251.
Carpenteri, I. 191, *249*.
v. *cerata*, I. 191, *250*, 251.
clavata, I. 249.
commutata, I. 250, 251, 252.
concava, I. 252.
concentrica, I. 191, *250*.
corpulenta, I. 192, *254*.
cuneata, I. 250, 251.
cuspidata, I. 249.
dilatata, I. 255.
eborea, I. 250.
fragilis, I. 251.
hebes, I. 192, *252*.
inornata, I. 251.
intermedia, I. 252.
jamaicensis, I. 250, 251.
Jeffreysi, I. 253.
messanensis, I. 191, *249*, 250, 251.
minuta, I. 252.
pusio, I. 192, *253*.
quadrangularis, I. 192, *253*.
solida, I. 252
solidifacta, I. 191, *252*.
solidula, I. 191, 250.
subæquilatera, I. 192, *252*.
unca, I. 250, 251; II. 438.
Verrilliana, I. 191, *251*.
vitrea, I. 250.
Leiomya, I. 196, *298*.
adunca, I. 196.
granulata, I. 196, *300*.
halimera, I. 197, *300*.
notabilis, I. 300.
scaber, I. 196.
Smithii, I. 196.
teres, I. 300.
v. *velvetina*, I. 196, *300*.
Leiostraca, II. 28, 326, *328*.
acuta, II. 28, *328*.
bilineata, II. 329.
fusus, II. 28, *329*.
Hemphillii, II. 329.
Leiostracus, II. 328.
Lembulus deltoideus, I. 251.
Lepetella, I. 181; II. 35, 350, *413*.*
tubicola, II. 35, *413*.
Lepetidæ, II. 436.
Leptochiton, II. 35, *414*, 417.
cancellatus, II. 414.
fuliginatus, II. 414.
pergranatus, II. 35, *414*.
Leptochitonidæ, II. 414.
Leptoidea, II. 414.
Leptonyx, II. 351, 352.
sanguineus, II. 351.
Leptothyra, II. 30, *351*, 455.
v. *albida*, II. 30, *352*, 353, 354.
carinata, II. 352.
filosa, II. 352.
induta, II. 30, 352.
v. *insculpta*, II. 30, *352*.
v. *limata*, II. 30, *353*.
Linnei, II. 30, 352, *353*.
mammilla, II. 352.
Philipiana, II. 30, 352, *353*.
sanguinea, II. 352, 353.
v. *tincta*, II. 30, *352*.
Le scalata, II. 299, 301, 303.
Leucosyrinx, II. 8, *75*, 81.
Sigsbeei, II. 8, *75*.
subgrundifera, II. 9, *77*.
tenoceras, II. 9, *75*, 77.
Verrillii, II. 8, *75*.
Leucozonia cingulata, II. 173.
cingulifera, II. 173.
dubia, II. 173.
ocellata, II. 173.
triserialis, II. 173.
Lienardia, II. 108.
Lima, I. 189, *224*.
albicoma, I. 189, *225*.
aperta, I. 225.
caribæa, I. 224.
fasciata, I. 224.
fragilis, I. 225.
hians, I. 189, *225*.
inflata, I. 189, *224*.
v. *planulata*, I. *224*.
scabra, I. 225.
squamosa, I. 189, *224*.
tenera, I. 189, *224*, 225.
Limæa, I. 189, *226*.
Bronniana, I. 189, *226*.
v. *lata*, I. 189, *226*, 227.
Sarsi, I. 226.

Limatula, I. 189, *225*.
  confusa, I. 226.
  ovata, I. 225, 226; II. 406.
  setifera, I. 189, *225*.
Limopsis, I. 186, 190, *236*; II. 455.
  antillensis, I. 190, *237*.
  aurita, I. 190, *237*.
  cristata, I. 190, *237*.
  minuta, I. 190, *236*.
  v. *paucidentata*, I. 237.
  tenella, I. 190, *236*.
Linatella Poulsenii, II. 228.
Link, D. H. F. *See* Museum Rostockianum, II. 304.
Liochlamys, II. 15, *173*.
  bulbosa, II. 15, *173*.
Lioconcha, I. 261, 262.
Liomesus, II. 15, 175, *176*, 177, 230.
  canaliculatus, II. 230.
  Stimpsoni, II. 15, *176*.
Liotia, II. 32, 375, *385*, 386, 387, 455.
  v. *aspina*, II. 33, *388*, 389.
  Bairdii, II. 33, 387, 388, *389*.
  Briareus, II. 32, 387, *388*,* 389, 390.
  cruentata, II. 386, 387.
  fenestrata, II. 386.
  v. *microforis*, II. 390.
  miniata, II. 33, 375, 387, *390*.
  v. *perforata*, II. 32, *388*.
  Riisii, II. 387.
  tricarinata, II. 33, 387, *389*, 390.
  v. *trullata*, II. 33, *389*.
  variabilis, II. 33, 387, *390*.
Liotina, II. 386.
Lippistes, II. 33, 386, 387, *391*.
  acrilla, II. 33, 387, *391*.
  amabilis, II. 33, 387, *392*.
  formosissima, II. 387, 391.
  Schrammi, II. 387.
Litorina anomala, II. 272.
  litorea, II. 272.
Livonia, II. 150.
Longchæus, II. 28, *331*, 334.
  candidus, II. 333.
Lophocardium, II. 443.
Lophyridæ, II. 416.
Lophyroidea, II. 414.
Loripes, I. 193, 265, *266*.
  compressa, I. 193, *266*; II., Pl. XIV.
  icterica, I. 265.
  lacteus, I. 266.
  lens, I. 193, *266*.
Lotorium femorale, II. 228.
Lucina, I. 193, *264*; II. 439.*
  americana, I. 266.
  antillarum, I. 193, *264*.
  borealis, I. 266.
  Candeana, I. 265.
  costata, I. 264.
  filosa, I. 266.
  funiculata, I. 193, *265*.
  jamaicensis, I. 265.
  lenticula, I. 193, *265*; II. 439.
  leucocyma, I. 193, *264*.
  multilineata, II. 439.
  quadrisulcata, I. 193, *266*.
  sagrinata, I. 193, *265*; II. 439.
  scabra, I. 193, *265*.
  sombrerensis, I. 193, *264*.
  spinosa, II. 439.
Lunatia, II. 26, 277, 278, 293, *295*.
  fringilla, II. 26, *295*.
  grönlandica, II. 296.
  heros, II. 278.
  leptalea, II. 26, *295*.
  v. *perla*, II. 26, *296*.
  semisulcata, II. 296.
  subplicata, II. 296.
  tenuis, II. 26, *295*.
  triseriata, II. 293.
  vittata, II. 293.
Lunella, II. 356.
  versicolor, II. 355.
Lyonsia, I. 284, 308; II. 439,* 446.
  Beana, II. 442.*
  bulla, I. 281, *283*.*
Lyonsiella, I. 196, 273, 281, 285, 287, *288*; II. 437,* 446,* 449,* 450,* 452.
  abyssicola, I. 272, 286, 288; II. 451.*
  angulata, I. 288.
  axinoides, I. 288.
  gemma, I. 288, 289.
  insculpta, I. 196, 288.
  mytiloides, I. 288.
  papyracea, II. 446.*
  radiata, II. 442,* 451.*
Lyria, II. 145, 147, 156.
Lyropecten, I. 206.

Machæroplax cancellatus, II. 361.
Macrodon, I. 191, *244*.
  asperula, I. 191, *244*.
  sagrinata, I. 191, *245*.
Mactra lateralis, II. 449.
Magilus, II. 220.
Malletia, I. 192, *253*.

Malletia amabilis, II. 438.
  arrouana, I. 255.
  cuneata, I. 255.
  cytherea, I. 192, *254;* II. 438.
  dilatata, I. 192, *255.*
  Smithii, I. 192, *255.*
  veneriformis, I. 254.
Mamillana, II. 150.
Mamma, II. 363.
Mangelia. *See* Mangilia.
  acanthodes, II. 114.
  hypsela, II. 91.
Mangilia, II. 10, *99,* 100, *111,* 455, 456.
  antonia, II. 11, *116.*
  atrostyla, II. 11, *111,* 112, 113.
  bandella, II. 11, *116.*
  caribæa, II. 10, *111.*
  cerina, II. 106, 111, *112,* 113.
  cerinella, II. 112.
  citronella, I., Expl. Pl. IX.; II. 106, *112.*
  columbella, II. 271.
  comatotropis, II. 11, *116.*
  corallina, II. 114.
  costulata, II. 99.
  v. diminuta, II. 11, *114.*
  elusiva, II. 11, *115.*
  ephamilla, II. 111, 112, 113.
  eritima, II. 113.
  exsculpta, II. 11, *117.*
  glypta, II. 181.
  halitropis, II. 11, *114.*
  ipara, II. 11, *115.*
  lanceolata, II. 101.
  Lavalleana, II. 11, *111.*
  limonitella, II. 112.
  lissotropis, II. 91.
  v. *Malmii,* II. 128.
  v. *monocingulata,* II. 11, *114.*
  muricoides, II. 101.
  pelagia, II. 11, *117.*
  pentagonalis, II. 90.
  Pourtalesii, I., Expl. Pl. IX.; II. 11, *118.*
  psila, II. 101.
  quadrata, II. 11, *113.*
  v. *rugirima,* II. 11, *114.*
  scipio, II. 11, *117.*
  serga, II. 11, 112, *114.*
  Simpsoni, II. 91.
  subsida, II. 11, *118.*
  tiara, II. 116.
  toreumata, II. 11, *118.*
Maravignia, II. 272.
Margariona, I. 227.
Margarita, II. 32, 350, *374,* 375, 377, 455.
  ægleës, II. 379.
  ægleis, II. 379.
  asperrima, II. 373.
  erythrocoma, II. 32, *375.*
  euspira, II. 32, *378.*
  filogyra, II. 356, 357.
  helicina, II. 374.
  imperialis, II. 32, *376.*
  infundibulum, II. 341,* 376, *380*,* 381.
  iris, II. 382.
  lacunella, II. 381.
  lamellosa, II. 379.
  lubrica, II. 382.
  maculata, II, 381.
  regalis, II. 380, 381.
  v. *samanœ,* II. 32, *375.*
  scabriuscula, II. 379.
Margarites, II. 374.
Margaritifera, II. 374.
Margaritiphora, II. 374.
Marginella, II. 12, *136,* 455.
  alba, II. 143.
  albolineata, II. 141, 142.
  amabilis, II. 12, *137.*
  apicina, II. 12, *136.*
  aureocincta, II. 139.
  avena, II. 141.
  avenacea, II. 141.
  avenella, II. 139.
  Beyerleana, II. 141.
  borealis, II. 136.
  caribæa, II. 136.
  carnea, II. 137.
  cassis, II. 12, *137.*
  catenata, II. 143.
  conoidalis, II. 136.
  denticulata, II. 139.
  elata, II. 139.
  flavida, II. 136.
  fusca, II. 13, *139.*
  fusina, II. 12, *138.*
  guttula, II. 141.
  hæmatita, II. 13, *138.*
  lachrimula, II. 142.
  lactea, II. 142.
  Lavalleana, II. 143.
  limatula, II. 136.
  livida, II. 136, 141.
  minima, II. 143.

Marginella minuta, II. 143.
  nitida, II. 140.
  oblonga, II. 137.
  opalina, II. 13, *138*, 140.
  pallida, II. 142.
  paxillus, II. 140.
  Redfieldii, II. 13, *139*, 140, 141.
  rostrata, II. 12, *137*.
  seminula, II. 13, *139*.
  Smithii, II. 139.
  styria, II. 13, *140*.
  subtriplicata, II. 142.
  succinea, II. 13, *139*, 140, 141.
  torticula, II. 13, 139, 140, *141*.
  triplicata, II. 142.
  varia, II. 141.
  Watsonii, II. 12, *137*.
  yucatecana, II. 13, *138*.
Marsenina ampla, II. 299.
Mastonia, II. 21, 242, *243*, 244.
Mathilda, II. 23, 257, 258, *266*, 301, 340.
  barbadense, II. 23, *266*, 267.
  elegantissima, II. 266.
  Rushii, II. 23, *267*, 341.
  scitula, II. 23, *267*.
  sinensis, II. 267.
  trochlea, II. 266.
  yucatecana, II. 23, 257, *266*, 267.
Mazzalina, II. 15, *173*.
  bulbosa, II. 173.
  pyrula, II. 15, *173*.
Megaptygma, II. 150.
Megathyris, I. 187, *203*. (*See* Cistella.)
Megerlia incerta, I. 201.
Megoptygma, II. 150.
Meiocardia, I. 271.
  Agassizii, I. 194, *271*; II. 439.
  vulgaris, I. 271.
Melanella, II. 28, *326*, 328.
  Dufresnei, II. 326, 328.
  gibba, II. 327.
Melania, II. 326, 456.
  rufa, II. 336.
Melanopsis, II. 132, 270.
  capula, II. 271.
Melantho, II. 326.
Meleagrina, II. 374.
Mesalia caribæa, II. 265.
  varia, II. 265.
Mesodon, II. 456.
Mesorhytis, II. 14, *172*.
  gracilentis, II. 172.
  Meekiana, II. 14, *172*.
Mesostoma, II. 24, *269*, 270.
  migrans, II. 24, *270*.
  pulchra, II. 269.
Meta cedonulli, II. 164.
Metaxia, II. 22, 252, *256*.
Microgaza, II. 30, 356, *357*.
  rotella, II. 30, *357*, 358.*
  solarioides, II. 358.
Microplax, II. 417.
Microvoluta, II. 163.
Mitra, II. 14, 98, *156*, 174.
  æthiopica, II. 160.
  albicostata, II. 157.
  albocincta, II. 157, 161, 165.
  alveolus, II. 157.
 v. *antillensis*, II. *158*.
  Bairdii, II. 14, *161*.
  barbadensis, II. 157.
  cæligena, II. 157.
  candida, II. 157.
  casta, II. 160.
  cavea, II. 157.
  chelonia, II. 157.
  Defrancei, II. 161.
  dermestina, II. 157.
  Deshayesii, II. 14, *160*.
  Dupontii, II. 157.
  ebenus, II. 157.
  exigua, II. 157.
  exilis, II. 157.
  floridana, II. 158.
  fulgurita, II. 14, *158*, 165.
  fusoides, II. 163.
  gemmata, II. 157.
  granulosa, II. 157.
  Hanleyana, II. 157.
  Hanleyi, II. 157, 163.
  histrio, II. 157.
  interpunctata, II. 157.
  lens, II. 157.
  longispira, II. 160.
  Malleti, II. 159.
  maura, II. 158.
  microzonias, II. 157.
  monilifera, II. 157.
  nasuta, II. 160.
  nitilina, II. 157.
  nodulosa, II. 157.
  nucleola, II. 157.
  obliquata, II. 157.
  pia, II. 159.
  picta, II. 157.
  puella, II. 157.

- Mitra pulchella, II. 157.
  - *Rushii*, II. 14, *160*.
  - rustica, II. 160.
  - semicostata, II. 157.
  - speciosa, II. 157.
  - staminea, II. 14, 157, *159*.
  - striatula, II. 157.
  - *styria*, II. 14, *159*, 163.
  - sulcata, II. 157.
  - Swainsoni, II. 14, *158*.
  - tessellata, II. 157.
  - tiarella, II. 157.
  - *torticula*, II. 14, *162*.
  - *trophonia*, II. 14, *161*.
- Mitromorpha, II. 14, *164*.
  - *biplicata*, II. 14, *165*.
  - dormitor, II. 164.
  - filosa, II. 164.
- Mitrularia, II. 25, *283*.
  - equestris, II. 25, *283*.
  - Neptuni, II. 283.
- Modiella, I. 234.
- Modiola, I. 190, 234.
  - cinnamomea, I. 236, 287.
  - lutea, I. 234,
  - opifex, I. 190, *235*.
  - polita, I. 181, 190, *234*.*
- Modiolarca, II. 446.
  - trapesina, II. 442, 451.
- Modiolaria, I. 190, *236*.
  - lateralis, I. 190, *236*.
  - lignea, I. 236.
  - polita, I. 234.
- Mohnia, II. 174, 175.
  - Mohni, II. 176.
- Mölleria, II. 393.
- Monodonta, II. 303.
- Monoptygma styliformis, II. 338.
- Mopaliidæ, II. 416.
- Mucronalia xanthias, II. 338.
- Murchisonella spectrum, II. 403.
- Murchisonia, II. 403.
  - spectrum, II. *403*.
- Murex, II. 17, *195*, 203, 210, 212, 215.
  - acanthopterus, II. 210.
  - adustus, II. 197, 198.
  - alveatus, II. *208*, 209, 211.
  - anus, II. 221.
  - asperrimus, II. 199.
  - Beaui, II. 17, *195*.
  - brassica, II. 197.
  - breviculus, II. 210.
  - brevifrons, II. 198.
- Murex brevispina, II. 209.
  - Cabritii, II. 17, *196*.
  - Cailleti, II. 17, *197*.
  - cancellata, II. 215.
  - cancellinus, II. 221.
  - carduus, II. 200.
  - casta, II. 211.
  - cataphracta, II. 81.
  - cellulosa, II. 210, 211.
  - chrysostoma, II. 197.
  - concinnus, II. 197.
  - costatus, II. 227.
  - cyclostomus, II. 211.
  - distinctus, II. 208, 210.
  - elegans, II. 17, 195, *196*, 197.
  - erosus, II. 210.
  - fimbriatus, II. 200.
  - florifer, II. 198.
  - Gundlachi, II. 196.
  - gyrinus, II. 223.
  - hexagonus, II. 212.
  - Hidalgoi, II. 198.
  - hystricina, II. 205.
  - imperialis, II. 199.
  - intermedius, II. 210.
  - interserratus, II. 199, 200.
  - jamaicensis, II. 211.
  - laceratus, II. 217.
  - leucoderma, II. 208.
  - luculentus, II. 200.
  - macropterus, II. 201.
  - messorius, II. 17, *196*.
  - metaxa, II. 256.
  - mexicanus, II. 199.
  - mulus, II. 221.
  - nodatus, II. 17, 195, 197.
  - nuceus, II. 210.
  - obeliscus, II. 208, 209.
  - ostrearum, II. 212.
  - palmarosæ, II. 197.
  - pauperculus, II. 208, 209, 211.
  - Pazi, II. 199, 200.
  - pileare, II. 227.
  - pomiformis, II. 199.
  - pomum, II. 197, *198*, 199, 201.
  - quadrifrons, II. 197, 198.
  - ramosus, II. 197.
  - rana, II. 222.
  - recurvirostris, II. 196, 197.
  - rufus, II. 197, 198, 201.
  - scalarinus, II. 208.
  - scalarioides, II. 207, *208*.
  - scalaroides, II. 208.

Murex spinacosta, II. 198.
spinicostata, II. 198.
subulatus, II. 252.
tetragonus, II. 211.
tornatus, II. 72.
trilineatus, II. 196.
tritonis, II. 225.
trunculus, II. 209.
Tryoni, II. 196.
virgo, II. 72.
zelandicus, II. 200.
Muricanthus radix, II. 197.
Muricidæ, II. 17, *194*.
Muricidea, II. 18, 209, *212*, 214.
Blainvillei, II. 212.
floridana, II. 18, *212*.
Hemphillii, II. 213.
hexagona, II. 18, 210, 212.
multangula, II. 18, 165, 174, *213*.
Philippiana, II. 18, *213*.
scalarioides, II. 208.
Muricopsis, II. 212.
Museum Boltenianum, II. 302.
Calonnianum, II. 302.
Rostockianum, II. 304.
Mya truncata, I. 310.
Myonera, I. 197, 293, *302*; II. 439, 441,* 448,* 450,* 452,* 455.
angularis, I. 302, 303.
lamellifera, I. 197, *304*.
laticella, I. 197, *305*.
limatula, I. 197, *304*.
paucistriata, I. 197, 293, *302*, 303,* 445.*
undata, I. 197, 302, *304*, 305.
Mytilimeria, I. 196, 286, *287*,* 288; II. 446.
flexuosa, I. 286.
Nuttallii, I. 196.
Mytilus, I. 190, *233*.
exustus, I. 190, *233*.
lateralis, I. 236.
luteus, I. 234.

Nassa, II. 16, 132, 177, 178, 180, 181, *183*.
acuta, II. 183, 185.
alba, II. 184.
ambigua, II. 16, *184*, 185.
annellifera, II. 184.
antillarum, II. 184.
Candei, II. 184.
candidissima, II. 184.
consensa, II. 16, 183, *185*.
Nassa exilis, II. 180.
guadeloupensis, II. 178.
Hotessieri, II. 16, 183, *185*, 186.
Hotessieriana, II. 185.
incrassata, II. 184.
nigrolabra, II. 184.
obtusata, II. 184.
ornata, II. 180.
papillosa, II. 180.
v. *pernitida*, II. 16, *186*.
pura, II. 184.
reticulata, II. 180.
scissurata, II. 16, *185*.
spinulosa, II. 186.
textilina, II. 178.
trivittata, II. 183.
unicincta, II. 178, 183.
vibex, II. 183.
Nassaria, II. 15, *180*, 181.
Nassarina, II. 15, *181*.
Bushii, II. 15, 181, *182*.
columbellata, II. 15, 181, *182*.
glypta, II. 15, *181*, 182.
Grayi, II. 15, 181, *183*.
Nassarius, II. 180.
Natica, II. 26, *292*, 386.
avellana, II. 292.
brunnea, II. 296.
campechiensis, II. 296.
canrena, II. 26, 292, *293*.
caribæa, II. 296.
castrensis, II. 26, *293*.
Dillwynii, II. 292.
duplicata, II. 296.
elenæ, II. 294.
Fordiana, II. 296.
fossata, II. 296.
fringilla, II. 295, 296.
intricata, II. 294, 295.
jamaicensis, II. 292.
lacernula, II. 293.
lactea, II. 296.
leptalea, II. 295.
limacina, II. 293.
lineata, II. 26, *294*.
livida, II. 26, *292*.
mamilla, II. 152.
mamillaris, II. 296.
maroccana, II. 26, *292*, 293.
marochiensis, II. 292.
ochrostoma, II. 296.
operculata, II. 295.
perlineata, II. 26, *294*.

Natica Pfeifferi, II. 296.
  porcellana, II. 296.
  proxima, II. 292, 293.
  pulchella, II. 293.
  pusilla, II. 296.
  radiata, II. 295, 296.
  rufilabris, II. 293.
  semisulcata, II. 296.
  sphæroides, II. 295.
  sulcata, II. 296.
  tenuis, II. 295.
  texasiana, II. 296.
  uberina, II. 296.
  vittata, II. 293.
Nautilus, I. 185.
Neæra, I. *292*.
  abbreviata, I. 301.
  adunca, I. 299.
  alternata, I. 297, 298.
  angularis, I. 302.
  arcuata, I. 296.
  behringensis, I. 296.
  Brazieri, I. 299.
  chinensis, I. 292.
  claviculata, I. 301, 302.
  congenita, I. 301.
  consociata, I. 304.
  contracta, I. 302, *304*.
  costata, I. 296.
  costellata, I. 297.
  curta, I. 297.
  fragilissima, I. 302.
  gomerensis, I. 300, 301.
  Gouldiana, I. 296.
  granulata, I. 299, *300*.
  inflata, I. 300, *301*.
  Jeffreysi, I. 295.
  lamellifera, I. 300, 302, *304*.
  laticella, I. 302.
  limatula, I. 302, *304*.
  multicostata, I. 298.
  notabilis, I. 300.
  obesa, I. 295, 303.*
  ornatissima, I. 296.
  paucistriata, I. 302.
  pectinata, I. 296.
  pellucida, I. 295.
  perrostrata, I. 296.
  philippinensis, I. 300.
  rostrata, I. 294.
  semistrigosa, I. 300, 304.
  striata, I. 298.
Neæra sulcifera, I. 302.
  teres, I. 300, 301.
  undata, I. 302, *304*.
Neilo dilatata, I. 255.
Neilonella, I. 192, *254*.
Neithea, I. 206, 222.
Nembrotha gratiosa, II. 453.
Neosimnia, II. 20, 234, *235*.
Neptunea, II. 174.
Neritina, II. 341,* 342, 344, 349.
  anomala, II. 359.
Neverita, II. 26, *294*.
  duplicata, II. 296.
  intricata, II. 294.
  nubila, II. 26, *294*.
Niso, II. 28, 281, 283, *329*.
  ægleës, II. 28, *330*, 331.
 v. *albida*, II. 28, *330*.
 v. *circinata*, II. 28, *330*.
  imbricata, II. 331.
  interrupta, II. 28, *330*, 331.
  splendidula, II. 28, *329*, 331.
 v. *tricolor*, II. 28, *330*.
  Willcoxiana, II. 28, *331*.
Nitidella, II. 16, 187, *189*.
  cribraria, II. 189.
  dichroa, II. 189.
 v. *dicomata*, II. 16, *189*.
  filosa, II. 194.
  lævigata, II. 189.
  moleculina, II. 16, *189*.
  nitidula, II. 16, *189*.
  parvula, II. 189.
Notoplax, II. 36, *416*.
  floridanus, II. 36, *416*,* 417.
  speciosus, II. 416, 417.
Nucula, I. 191, *245*; II. 377, 434.*
  acuta, I. 251.
  ægeënsis, I. 191, *246*.
  cancellata, I. 248.
  crenulata, I. 191, *247*.
  culebrensis, I. 247.
  cymella, I. 191, *246*.
 v. *obliterata*, I. 191, *247*.
  proxima, I. 246.
  pusio, I. 253.
  sulcata, I. 247.
  tenuis, I. 246.
  trigona, I. 248.
  Verrillii, I. 191, *248*.
Nuculana, I. 245.
Nuculocardia divaricata, I. 235.

Obeliscus, II. 331, 335.
  arenosus, II. 331.
  candidus, II. 333.
  crenulatus, II. 331.
  floridanus, II. 331.
  hastatus, II. 332.
  nitidulus, II. 334.
  sufarcinatus, II. 334.
  tessellatus, II. 331.
  tinctus, II. 334.
  turritus, II. 335.
  nuceus, II. 210.
Ocinebra, II. 18, 199, 209, *210*.
  Cantrainei, II. 208.
  erinacea, II. 210, 214.
  scalaroides, II. 208.
Odostomia, II. 334.
  alba, II. 327.
  fulvocincta, II. 336.
  nitidula, II. 334.
  rufa, II. 336.
  unifasciata, II. 338.
Oliva, II. 12, *133*, Pl. XXXIV.*
  conoidalis, II. 134.
  litterata, II. 12, *133*, Pl. XXXIV.*
  mutica, II. 133.
  reticularis, II. 12, *133*.
  Sayana, II. 133.
Olivella, II. 12, *133*.
  bullula, II. 12, *135*.
  exigua, II. 134.
  floralia, II. 136.
  fuscocincta, II. 12, *134*, 135.
  jaspidea, II. 12, *134*, 135.
  mutica, II. 12, *133*.*
  nitidula, II. 134.
  nympha, II. 136.
  v. *rotunda*, II. 12, *134*.
  tubulata, II. 12, *136*.
  zonalis, II. 133.
Omalalaxis, II. 276.
Omalaxis, II. 24, *276*.
  lirata, II. 278.
  nobilis, II. 24, *276*.
  zanclea, II. 276.
Omalaxon, II. 276.
Omaloxon, II. 276.
Ombrella, II. 60.
Onchidium, II. 437.
Oniscia oniscus, II. 231.
Oniscidia, II. 20, *231*.
  Dennisoni, II. 20, *231*.
Oöcorys, II. 19, 175, *228*, 229, 231, 233.
Oöcorys abyssorum, II. 19, *229*.
  sulcata, II. 19, *228*, 229, 230.
Opalia, II. 300, 308, 324.
  anomala, II. 306.
  borealis, II. *308*, 324.
  Gouldii, II. 308.
  longissima, II. 324.
  scæva, II. 320.
  subvaricosa, II. 320.
  Wroblewskyi, II. 308, 324.
Operculatum, II. 60.
  bermudense, II. 61.
Opsichitonia, II. 36, 414, *416*.
Orbis, II. 276.
  Pingeli, II. 276.
Oscilla, II. 29, *339*.
  annulata, II. 339.
  nivea, II. 29, *339*, 340.
Ostrea fasciata, I. 224.
  hians, I. 225.
  spondyloidea, I. 227.
  tenuiplicata, I. 231.
Otocheilus mississippiensis, II. 145.
Ovula acicularis, II. 234.
  carnea, II. 234.
  carolinensis, II. 236.
  oblonga, II. 235.
  patula, II. 237.
  spelta, II. 235.
Ovulactæon, II. 5, *42*, 242.
  Meekii, II. 5, *43*.
Ovulum aciculare, II. 234.
  antillarum, II. 236.
  arcuatum, II. 236.
  gibbosum, II. 237.
  intermedium, II. 235.
  subrostratum, II. 236.
  uniplicatum, II. 235.
Oxygyrus, II. 386.
Oxystele, II. 378.

Padollus Pourtalesii, II. 395.
Pallium, I. 206.
Pandora, I. 197, *311*.
  brevifrons, I. 311.
  Bushiana, I. 197, 311, *312*.
  carolinensis, I. *311*, 312.
  depressa, I. 312.
  floridana, I. 312.
  glacialis, I. 311.
  Gouldiana, I. 197, *312*.
  nasuta, I. 312.
  oblonga, I. 311.

Pandora tabacea, I. 312.
  trilineata, I. 311.
Parastarte, I. 259.
Parkeria, II. 360.
Parmophorus, II. 345.
Patella, II. 347, 411,* 450.
  aculeata, II. 285.
  albicosta, II. 409.
  antillarum, II. 343, *409*.
  auricula, II. 284.
  calyptra, II. 287.
  chinensis, II. 285.
  compressa, II. 413.
  confusa, II. 410.
  cubaniana, II. 409.
  leucopleura, II. 409.
  melanoleuca, II. 409, 410.
  notata, II. 409.
  porcellana, II. 285.
  puncturata, II. 409.
  pustula, II. 409.
  surinamensis, II. 409.
  trochiformis, II. 285.
Patellidæ, II. 437.
Payraudeautia, II. 26, *294*.
Paziella, II. 199, 200.
Pecchiolia, I. 196, *287*, 288.
  angulata, I. 288.
  argentea, I. 196, *287*.
  subquadrata, I. 272, 273.
  tornata, I. 281.
Pecten, I. 188, *206*;* II. 434,* 455.
  alaskensis, I. 215.
  antillarum, I. 188, 206,* *218*.*
  antiquatus, I. 213.
  asper, I. 217.
  caurinus, I. 188, 206,* *216*.*
  Clintonius, I. 216.
  concentricus, I. 213.
  dislocatus, I. 188, *216*, 217.
  dispar, I. 219.
  effluens, I. 188, *219*.
  exasperatus, I. 188, *218*.
  fimbriatus, I. 213.
  furtivus, I. 219, 220.
  fusco-purpureus, I. 218.
  hemicyclicus, I. 207.
  Hoskynsi, I. 221, 213.
  imbrifer, I. 189, 214, *220*, 221.
  irradians, I. 206.*
  leptalea, I. 221.
  lucidum, I. 212.
  magellanicus, I. 188, 206,* 207, *216*, 222.
Pecten mammillatus, I. 220.
  meridionale, I. 212.
  nodosus, I. 235.
  noronhensis, I. 218.
  nucleus, I. 188, 206,* *216*, 217.
  ornatus, I. 188, *218*.
  Philippii, I. 217.
  phrygium, I. 188, *217*, 218*; II. 438.
  pleuronectes, I. 207, 208.
  Pourtalesianum, I. 212.
  principoides, I. 216.
  pseudamusium, I. 219.
  purpuratus, I. 217.
  pustulosus, I. 220.
  reticulus, I. 189, *221*.
  rigida, I. 219.
  Sigsbeei, I. 189, *223*.
  similis, I. 207.
  tenuicostatus, I. 216.
  thalassinus, I. 189, *221*.
  Tryoni (= P. glyptus Ver.), II. 438.
  ziczac, I. 207.
Pectinibranchiata, II. 62.
Pectinium, I. 208.
Pectinodonta, II. 35, *411*.*
  arcuata, II. 35, *411*.
Pectunculus, I. 190.
  angulatus, I. 238.
  aratus, I. 239.
  v. *carinatus*, I. 190, *239*, 240.
  carolinensis, I. 238, 239.
  charlestonensis, I. 239.
  decussatus, I. 238.
  hirtus, I. 238.
  lineatus, I. 238, 239.
  oculatus, I. 239.
  parilis, I. 238.
  passus, I. 238.
  pectinatus, I. 190, *239*.
  pectiniformis, I. 239.
  pennaceus, I. 238.
  pilosus, I. 239.
  quinquerugatus, I. 238.
  scriptus, I. 190, 238.
  tricenarius, I. 238.
  undatus, I. 190, *238*, 239.
  undulatus, I. 238.
  variegatus, I. 239.
Pedicularia, II. 20, 234, *237*, 238.*
  albida, II. 237.
  decussata, II. 20, *237*, 238.*
  sicula, II. 238.
Periploma, I. 197, *305*, 308, 309.

Periploma angulifera, I. 305, 306.
  fragilis, I. 197, *306*.*
  inæquivalvis, I. 305.
  papyracea, I. 197, *306*.*
  papyratia, I. 306.
  undulata, I. 306.
Peristichia, II. 29, *339*.
  agria, II. 29, *340*.
  toreta, II. 29, 339, *340*.
Perna, II. 450, 451.
  ephippium, II. 434, 442, 450.
Perotrochus, II. 34, *397*.
Perrieria, II. 200.
Persicula, II. 13, 136, *143*.
  catenata, II. 13, *143*.
Persona, II. 220.
  anus, II. 220.
Petaloconchus, II. 23, *262*.
  irregularis, II. 262.
Petricola, I. 194, *276*.
  divaricata, I. 194, *276*.
Pharcidella, II. 29, *333*, 334.
  Folinii, II. 29, *334*.
Phasianella, II. 30, 302, 326, *351*.
  affinis, II. 351.
  brevis, II. 30, *351*.
  concinna, II. 351.
  concolor, II. 351.
  inflexa, II. 326, 328.
  pulchella, II. 351.
  tessellata, II. 351.
  umbilicata, II. 351.
Phasianema, II. 278.
Philine, II. 7, *57*.
  amabilis, II. 59.
  angulata, II. 58.
  aperta, II. 58.
  Candeana, II. 58.
  finmarchica, II. 57.
  flexuosa, II. 7, *59*.
  infundibulum, II. 7, *57*,* 58.
  planata, II. 7, *58*.*
  quadrata, II. 57.
  sagra, II. 58.
Phlegmodoris anceps, II. 453.
Phorus, II. 290.
Phos, II. 15, *177*, 178.
  antillarum, II. 179.
  Beaui, II. 15, *178*,* 179, 180.
  Candei, II. 15, 179.
  erectus, II. 179.
  Grateloupianus, II. 179.
  guadeloupensis, II. 178.
Phos intricatus, II. 15, 180.
  pallidus, II. 178.
  parvus, II. 15, *180*, 226.
  senticosus, II. 179, 180.
  unicinctus, II. 15, *178*.
  veraguaënsis, II. 179.
Phyllidiopsis papilligera, II. 453.
Phyllonotus, II. 17, *198*, 199.
  fulvescens, II. 17, 198.
  hystricinus, II. 17, 200, 205.
  interserratus, II. 17, *199*, 200.
  Pazi, II. 17, *199*.
  pomum, II. 17, 197, *198*.
Pilidium fulvum, II. 412.
Piliscus Krebsii, II. 290.
Pisania, II. 15, *177*.
  æthiops, II. 177.
  coromandeliana, II. 180.
  janeirense, II. 177.
  maculosa, II. 177.
  pusio, II. 177.
  striata, II. 177.
  tranquebarica, II. 180.
  undosa, II. 180.
Placophoridæ, II. 416.
Platidia, I. 187, *204*.
  anomioides, I. 187, *204*.
  v. *radiata*, I. 187, *204*.*
Plectodon, I. 196, 299, *300*; II. 395.
  granulata, I. 300.
  scaber, I. 295, 299.
  v. *velvetina*, I. 300.
Plejona, II. 146.
Pleuronectia, I. 208.
  lucida, I. 211.
Pleurotoma, II. 8, *72*, 303, 455.
  acanthodes, II. 114.
  albella, II. 188.
  albida, II. 8, *72*, 73.
  amblia, II. 92.
  antillarum, II. 72, 111.
  antonia, II. 116.
  bandella, II. 116.
  Barretti, II. 72.
  buccinoides, II. 180.
  calliope, II. 78.
  caribæa, II. 111.
  cataphracta, II. 80.
  Catherinæ, II. 100.
  cedonulli, II. 77, 78.
  chariessa, II. 122.
  chyta, II. 115.
  circinata, II. 99.

Pleurotoma circumvoluta, II. 84.
  cirrata, II. 128.
  cirratum, II. 128.
  coccinata, II. 90.
  columbaria, II. 78.
  columbella, II. 271.
  comatotropis, II. 116.
  controversa, II. 78.
  corticaria, II. 114.
  Dalli, II. 92.
  detecta, II. 84.
  didyma, II. 79.
  diminuta, II. 113, 114.
  ebur, II. 89.
  elusiva, II. 115.
  exasperata, II. 88.
  exsculpta, II. 117.
  extensa, II. 126.
  filifera, II. 123.
  fucata, II. 89.
  gratula, II. 110.
  haitensis, II. 72.
  havanensis, II. 93.
  hormophora, II. 106.
  hypsela, II. 91.
  incilis, II. 110.
  insignis, II. 99.
  ipara, II. 115.
  Jelskii, II. 72.
  Lavalleana, II. 111.
  leucomata, II. 120.
  leucophlegma, II. 102.
  limacina, II. 106.
  lissotropis, II. 91.
  lithocolleta, II. 95.
  lunata, II. 95, 96.
  mitrella, II. 79.
 v. normalis, II. 126.
  nucleata, II. 92.
  oleacina, II. 94.
  pagoda, II. 99.
  paria, II. 89.
  pelagia, II. 117.
  peripla, II. 115.
  periscelida, II. 8, *74*.
  perpauxilla, II. 115, 116.
  polytorta, II. 85.
  Pourtalesii, II. 118.
  quadrata, II. 113.
  serga, I., Expl. Pl. IX.; II. 114.
  Sigsbeei, II. 76.
  Simpsoni, II. 91.
  sinuata, II. 180.
Pleurotoma smirna, II. 94.
  speciosa, II. 75.
  streptophora, II. 126.
  subgrundifera, II. 76.
  subsida, II. 118.
 v. *tellea*, II. 8, 72, *73*.
  tiara, II. 116.
  Verrillii, II. 75, 93.
  Vespuciana, II. 111.
  vibex, II. 8, *73*.
  virgo, II. 72.
Pleurotomaire, II. 396.
Pleurotomaria, I. 185; II. 34, 368, 377, *396*.
  Adansoniana, II. 34, *400*,* 434,* 435.*
  Quoyana, II. 34, *397*,* 400, 401, 402.
Pleurotomella, II. 11, 99, *119*.
  Agassizii, II. 11, *121*.
 v. *agria*, II. 11, *127*.
 v. *aresta*, II. 11, *123*.
  Bairdii, II. 122, 123.
  bandella, II. 116.
 v. Benedicti, II. 11, *119*.
  Blakeana, II. 11, *126*.
  catasarca, II. 11, *124*, 125.
  chariessa, II. 11, *122*, 123.
  diomedeæ, II. 116.
  Edgariana, II. 11, *121*, 122, 125.
  Emertonii, II. 11, 104, *122*.
  extensa, II. 11, *126*.
  filifera, II. 11, *123*.
 v. formosa, II. 11, *119*.
  hadria, II. 11, *125*.
  Jeffreysii, II. 122, 123.
  leucomata, II. 11, *120*.
 v. *Malmii*, II. 11, *127*, 128.
 v. *mexicana*, II. 121.
  Packardi, II. 11, 99, *119*.
 v. *phalera*, II. 11, *123*.
  Saffordi, II. 119.
  Sandersoni, II. 121.
  Sigsbeei, II. 76.
 v. *spica*, II. 11, *123*.
 v. *tellea*, II. 11, *123*.
  Verrillii, II. 75.
Pleurotomidæ, II. 8, *71*.*
  larval shells, II. 124.
Plicatula, I. 189.
  marginata, I. 227.
  ramosa, I. 227.
  spondyloidea, I. 189, *227*.
Polyconchæ, II. 35, *413*.

Polynices, II. 26, *296*.
  brunnea, II. 296.
  mamillaris, II. 296.
  uberina, II. 26, *296*.
Pomatoceras, II. 418.
Poromya, I. 195, *280*,* 281, 288, 299; II. 61, 395, 441, 446,* 449,* 450,* 452.*
  albida, I. 195, *282*.
  anatinoides, I. 280, 281.
  australis, I. *281*, 282.
  bulla, I. 195, *283*;* II. 440.*
  elongata, I. 195, *283*;* II. 440.*
  granatina, I. 316.
  granulata, I. 195, 280, *281*, 282,* 284; II. 443, 448.*
  lævis, I. 281.
  mactroides, II. 443, *448*.*
  margarita, I. 195, *284*.
  neæroides, I. 281, 282, 283.
  rotundata, I. 282.
  sublevis, I. 281, 282; II. 448.*
Poweria, II. 206.
  scalarina, II. 208.
Propeamusium, I. 188, 206, *210*.
Propilidium, II. 35, 346, 410, *412*.
  ancyloide, II. 35, *412*.*
  elegans, II 412.*
  pertenue, II. 412.
Proscenula, II. 284.
Psephæa concinna, II. 150.
Pseudamusium, I. 189, 206, 218, *219*.
  pustulosum, I. 222.
  strigillatum, II. 438.
  thalassinum, I. 207, *221*.
Pseudomalaxis, II. 276.
Pseudomurex, II. 212, 217.
Pseudorotella, II. 360.
  semistriata, II. 360, 361.
Psychrosoma, II. 300, 308.
Ptenoglossa, II. 27, *299*.
Pteronotus, II. 17, *201*, 203.
  cordismei, II. 201.
  macropterus, II. 17, *201*.
  phaneus, II. 17, *201*.
  tristichus, II. 17, *202*.
Pteropurpura macroptera, II. 201.
Ptychosalpinx, II. 175, 176.
  altile, II. 176.
  Escheri, II. 176.
  globulus, II. 175.
Puncturella, II. 34, *403*, 404,* 405, 412.
  asturiana, II. 405.
  circularis, II. 34, *403*.
Puncturella noachina, II. 405.
  rostrata, II. 404.
  trifolium, II. 34, *403*.
  Watsoni, II. 34, *403*.
Purpura, II. 18, 81, *217*.
  deltoidea, II. 217.
  floridana, II. 217.
  hæmastoma, II. 217.
  patula, II. 217.
  trinidadensis, II. 217.
  undata, II. 217.
Pyramidella, II. 28, *331*, 332, 333, 334, 335, 339.
  alveata, II. 331.
  arenosa, II. 332.
  auricoma, II. 28, *332*.
  candida, II. 28, 332, *333*, 334.
  conica, II. 331, 332, 333.
  crenulata, II. 28, *331*, 332,* 333.
  dolabrata, II. 29, *334*.
  Folinii, II. 29, *334*.
  Gundlachi, II. 333.
  hastata, II. 331.
  mediterranea, II. 334.
  minuscula, II. 334.
  monilifera, II. 332.
  nitidula, II. 29, *334*.
  tessellata, II. 331.
  variegata, II. 332.
Pyrene strix, II. 192.
Pyrgiscus, II. 301.
Pyrgulifera, II. 132.

Radius, II. 234.
Rana, II. 222.
Ranella, II. 206, 209, 212, *223*.
  affinis, II. 224.
  anceps, II. 206, *207*, 224.
  caudata, II. 202.
  crassa, II. 224.
  crumena, II. 223.
  cubaniana, II. 224.
  gigantea, II. 224.
  granifera, II. 224.
  granulata, II. 224.
  Grayana, II. 224.
  hastula, II. *207*, 211, 224.
  lamellosa, II. 208, 209.
  lanceolata, II. 225.
  livida, II. 224.
  muriciformis, II. 204.
  ponderosa, II. 224.
  producta, II. 207.

Ranella pyramidalis, II. 207.
  rhodostoma, II. 224.
  siphonata, II. 223.
  spinosa, II. 222.
  thomæ, II. 224.
Ranularia, II. 19, *226.*
  tuberosa, II. 19, *226.*
Retusa, II. 6, *49.*
  cælata, II. 45.
  obesiuscula, II. 6, *49.*
  omphalis, II. 45.
  ovata, II. 6, 45, *49.*
  sulcata, II. 45.
Rhinoclama, I. 197, 299, *300.*
  teres, I. 301.
Rhinomya, I. 300.
Rhizocheilus antipathicus, II. 218.
  madreporarum, II. 218, *220.*
Rhizorus, II. 51, 234.
Ricinula, II. 217.
Rimula, II. 34, *405*, 406.
  asturiana, II. 350, *404.*
  capuliformis, II. 404.
  frenulata, II. 34, *406.*
  messanensis, II. 404.
Ringicula, II. 5, *43.*
  floridana, II. 5, *44.*
 v. *Guppyi*, II. 5, *44.*
  leptocheila, II. 43, 44.
  nitida, II. 5, *43.*
  peracuta, II. 43, 44.
  semistriata, II. 44.
  tridentata, II. 44.
Ringiculina, II. 5, *43.*
Rissoa, II. 25, *279.*
  aculeus, II. 280.
  acuticostata, II. 25, *280.*
  apicina, II. 280.
  arenaria, II. 280.
  areolata, II. 280.
  australis, II. 280.
  brychia, II. 280.
  carinata, II. 280.
  castanea, II. 280.
  coronata, II. 320.
  deliciosa, II. 280.
  harpa, II. 280.
  Jan-Mayeni, II. 280.
  leptalea, II. 280.
  melanura, II. 258.
  pelagica, II. 280.
  precipitata, II. 25, *279.*
  pyrrhias, II. 280.
Rissoa Sandersoni, II. 280.
  syngenes, II. 280.
  tenuisculpta, II. 280.
  tervaricosa, II. 258.
  turgida, II. 280.
  xanthias, II. 280.
Rissoina, II. 25, *281*, 340.
  albida, II. 25, *281.*
  bryerea, II. 281.
  cancellata, II. 281.
  Catesbyana, II. 281.
  Chesnelii, II. 25, *281.*
  decussata, II. 25, *281.*
  denticulata, II. 317.
  lævigata, II. 25, *281.*
  multicostata, II. 281.
  Philippiana, II. 281.
  pulchra, II. 281.
  Sagraiana, II. 281.
  scalarella, II. 281.
  scalaroides, II. 281.
  striatocostata, II. 281.
  striosa, II. 281.
Rotella, II. 358.
Rupicola, I. 306.

Sabalia, II. 53.
Sabatia, II. 6, *53.*
  bathymophila, II. 6, *53.*
  Isseli, II. 53, 54.
Sandalium, II. 25, *285*, 286.
Saturnia, I. 192, *253.*
Saxicava, I. 198, *317.*
  azaria, I. 198, *317.*
  rugosa, I. 317.
Scala, II. 27, *299*, 300, 301, 306,* 455.
  apiculata, II. 27, *310.*
  aurifila, II. 28, *322.*
  babylonia, II. 27, *311*, 312.
 v. *bahamensis*, II. 317.
  belaurita, II. 27, *316.*
 v. *bicarinata*, II. 28, *321.*
  centiquadra, II. 27, 311, 315, *317*, 318.
  clathratula, II. 309, 315.
  clathrus, II. 27, 300, 305, 306,* 309, *311*, 314.
  communis, II. 306.*
  commutata, II. 311.
  concava, II. 28, *323.*
  contorquata, II. 27, *318.*
  costulata, II. 27, *307.*
  Dalliana, II. 27, 312, *315.*

Scala decussata, II. 312, 313.
denticulata, II. 317.
Dianæ, II. 317.
discobolaria, II. 28, *324*.
dubia, II. 313.
Dunkeriana, II. 27, *315*.
eburnea, II. 27, *315*.
formosissima, II. 27, *319*.
Frielei, II. 27, *313*.
grandis, II. 302.
hellenica, II. 27, *320*, 321.
hyalina, II. 316.
Krebsii, II. 27, *318*.
lamellosa, II. 311.
v. Leeana, II. 27, *321*.
lineata, II. 27, *307*.*
maculata, II. 302.
modesta, II. 27, *311*.
v. *Mörchiana*, II. 28, 321, *322*.
multistriata, II. 27, *309*,* 310.
muscapedia, II. 27, *314*.
nitidella, II. 27, *314*.
v. nodosocarinata, II. 27, *321*.
notha, II. 302.
permodesta, II. 27, *311*.
pernobilis, II. 27, *316*,* 317.
polacia, II. 27, *319*.
Pourtalesii, II. 27, *317*.
v. pumilio, II. 27, 320, *321*.
retifera, II. 27, *312*.
Rushii, II. 27, *313*.
Sayana, II. 27, 306,* 307, *309*.*
v. scæva, II. 27, 320, *321*.
scipio, II. 27, *310*.
sericifila, II. 27, *313*.
soluta, II. 315.
v. *stylina*, II. 27, *313*.
subvaricosa, II. 321.
Swiftii, II. 318.
Trevelyana, II. 306.*
turricula, II. 318.
uncinaticosta, II. 27, *318*.
undecimcostata, II. 311.
venosa, II. 311.
Scalaria, II. *299*, 300, 303, 304, 305.
aciculina, II. 310.
acuminata, II. 300.
angulata, II. 309.
australis, II. 300.
bicarinata, II. 320.
borealis, II. 308.
clathratula, II. 315.
clathrus, II. 300, 301.
Scalaria cochlea, II. 300.
communis, II. 299, 300, 309.
costulata, II. 308.
crassilabris, II. 320.
crassilabrum, II. 320.
decussata, II. 312.
dubia, II. 313.
Eschrichtii, II. 300, 308.
formosissima, II. 319.
fragilis, II. 315.
hellenica, II. 320.
Humphreysii, II. 309.
inconspicua, II. 300.
lamellosa, II. 302, 311.
Leeana, II. 320.
leptalea, II. 309.
lineolata, II. 314.
magnifica, II. 300.
modesta, II. 311.
multistriata, II. 309.*
pachypleura, II. 300.
pernobilis, II. 316.
Pourtalesii, II. 317.
pretiosa, II. 299, 300, *301*, 375.
Scacchii, II. 320.
scalaris, II. 300.
semidisjuncta, II. 314.
soluta, II. 315.
subvaricosa, II. 320.
trinodosa, II. 300.
triquintinaria, II. 300.
turbinata, II. 309.
uncinaticosta, II. 318.
unifasciata, II. 300.
varicosa, II. 300.
varicostata, II. 300.
Scalarus, II. 299.
Scalatarius, II. 299.
Scalina, II. 300, 301.
triquintinaria, II. 300.
Scaliola, II. 300, 306.
bella, II. 300.
Scaphander, II. 6, *52*.
gracilis, II. 54.
librarius, II. 52.
lignarius, II. 52, 53.
niveus, II. 54.
nobilis, II. 53.
punctostriatus, II. 6, *52*.
Watsoni, II. 6, *52*.
Scaphella, II. 13, 144, *147*,* 451, 452.*
ancilla, II. 145, 147.
concinna, II. 150, 151.

Scaphella demissa, II. 150.
  dubia, II. 144, *150*, 154.
  Gouldiana, II. 144, *154*.
  junonia, II. 13, 67, *148*, 152, 153, 154, 156.
  Lamberti, II. 145.
  lyriformis, II. 150.
  magellanica, II. 452.*
  megaspira, II. 150, 151.
  mutabilis, II. 152, 154.
  Newcombiana, II. 145.
  Prevostiana, II. 150, 151.
  robusta, II. 144.
  scapha, II. 156.
  Stearnsii, II. 145, 151, *155*.*
  undulata, II. 148.
Schismatobranchia, II. 341.*
Schizochitonidæ, II. 416.
Schizoplax, II. 416.
Schizotrochus, II. 33, *396*.
Scissurella, II. 33, *396*.
  alta, II. 33, *396*.
  crispata, II. 33, *396*.
Scobinella, II. 98.
  cælata, II. 98.
Scoliostoma, II. 301.
Sconsia, II. 20, 230, 231, *232*.
  striata, II. 20, *232*.
Scurria, II. 436,* 450.*
Scutella, II. 342.*
Scutellina, II. 29, *342*,* 343, 410, 411, 437.
  antillarum, II. 30, *342*, 343.*
  crenulata, II. 342.
  ferruginea, II. 342.
Seguenzia, II. 23, *268*, 274, 383, 385, 403.
  carinata, II. 383.
  delicatula, II. 384.
  elegans, II. 383.
  eritima, II. 269.
  formosa, II. 268, 269.
  ionica, II. 23, *268*.
  monocingulata, II. 23, *268*.
  nitida, II. 269.
  trispinosa, II. *268*, 383.
Seila, II. 22, *250*.
  dextroversus, II. 250.
  terebralis, II. 22, *250*, 251.*
Semele, I. 195, *279*.
  cancellata, I. 195, *279*.
  obliqua, I. 195, *279*.
Seminella Stearnsii, II. 194.
Separatista, II. 24, *277*.
  cingulata, II. 24, *277*.*
Serpula lumbricalis, II. 261, 453.
Sigaretus, II. 26, *297*,* 298, 300.
  antillarum, II. 297.
  depressus, II. 297.
  haliotoideus, II. 297.
  maculatus, II. 297.
  martinianus, II. 297.
  minor, II. 26, *297*.
  perspectivus, II. 297,* 300.
  problematicus, II. 298.
  zonatus, II. 297.
Silenia, II. 441, 447, 451.
  Sarsii, II. 447.
Siliquaria, II. 23, *259*.
  modesta, II. 23, *260*.
  ruber, II. 259.
  squamata, II. 23, *260*.
Simnia, II. 20, *234*.
  acicularis, II. 20, *234*.
  aureocincta, II. 20, *236*.
  intermedia, II. 20, *235*.
  lanceolata, II. 235, 237.
  niceënsis, II. 237.
  piragua, II. 20, *235*.
  purpurea, II. 237.
  spelta, II. 236, 237.
  uniplicata, II. 20, 234, *235*, 237.
Sinusigera, II. 124.
Sipho, II. 15, *174*.
  Bocagei, II. 174.
  cælatulus, II. 174.
  globulus, II. 15, *175*, 176.*
  glyptus, II. 166, 169.
  profundicola, II. 174.
  Rushii, II. 15, *175*.
  Sarsii, II. 174.
Siphonaria, II. 437.
Siphonodentalium, II. 428.
  quadridentatum, II. 428.
Sistrum, II. 18, *217*.
  ferrugineum, II. 217.
  nodulosum, II. 217.
  roseum, II. 217.
 v. *rubidum*, II. 18, *217*.
Skenea lirata, II. 278.
  trilix, II. 278.
Solariella, II. 32, 374, 377, *378*.
  ægleis, II. 32, *379*, 380, 381.
  affinis, II. 380.
  amabilis, II. 32, *378*, 379.
  cincta, II. 380.
 v. clavata, II. 32, *380*.
 v. *depressa*, II. 32, *382*.

Solariella infundibulum, II. 32, *380*, 381.*
 v. *iridea*, II. 32, *382*.
  iris, II. 32, *382*.
  lacunella, II. 32, *381*, 382.
  lamellosa, II. 32, *379*, 380.
 v. *lata*, II. 32, *380*.
  lissocona, II. 32, *381*.
  lubrica, II. 32, *382*.
  maculata, II. 379, 380, 381.
  Ottoi, II. 32, 380, *381*.
  peregrina, II. 380.
  rhina, II. 32, *380*.
  scabriuscula, II. 32, *379*.
Solarium, II. 24, 274.
  borealis, II. 276.
  granulatum, II. 24, *274*.
  hemisphericum, II. 275.
  nobile, II. 274.
  peracutum, II. 24, *275*.
  peregrina, II. 380.
  reticulatum, II. 385.
  Sigsbeei, II. 24, *275*.
  turbinoides, II. 379.
  verrucosum, II. 274.
Solenella, I. 248.
Solenosmilia variabilis, II. 237.
Sphena alternata, I. 297.
Spirotropis, II. 62, 94, 133.
Spondylus, I. 189, *227*.
  Gussoni, I. 189, *227*.
Stectoplax, II. 417.
  porrectus, II. 417.
Stenoplax, II. 35, *415*.
  limaciformis, II. 415.
Sthenorhytis, II. 300.
  belaurita, II. 316.
  pachypleura, II. 300.
  pernobilis, II. 316.
Stigmaulax sulcata, II. 296.
Stomatia azonea, II. 298.
Strigatella, II. 163.
Stylopsis, II. 29, *338*.
Styloptigma, II. 335.
  turrita, II. 335.
Subemarginula, II. 34, *407*.
  octoradiata, II. 34, *407*.
Subula, II. 8, *62*.
Subularia, II. 328.
Surcula gonioides, II. 77, 125.
  staminea, II. 77.
Sychar, II. 21, 242, *247*.
Syncyclonema, I. 219.
Syndosmya, I. 278.
Syndosmya lioica, I. 278.
  longicallis, I. 278.
Syrnola, II. 29, 333, 335, *339*.
  nitidula, II. 334.
  pulchella, II. 331, 333.

Tachyrhynchus, II. 274.
Tæniodon, I. 198, *315*.
Tapes turgida, II. 440.
Taranis, II. 11, 99, *128*.
  cirrata, II. 11, *128*.
  Mörchii, II. 127, *128*.
  pulchella, II. 116.
 v. tornata, II. 127, 128.
Tectura, II. 345.
  adunca, II. 345.
  galeola, II. 346.
  pusilla, II. 345.
  rugosa, II. 346.
Teinostoma, II. 31, 359, *360*.
  cryptospira, II. 361.
  politum, II. 359.
  semistriata, II. 360, 361.
Tellina, I. 194, *277*.
  Antoni, I. 194, *277;* II. 440.
  cuspidata, I, 292.
  Gouldii, I. 195, *278*.
  obliqua, I. 279.
  plectrum, I. 195, *277*.
  Souleyetiana, II. 440.
  squamifera, I. 194, *277;* II. 440.
  sybaritica, I. 195, *277;* II. 440.
  tenera, I. 195, *277*.
  tenta, II. 440.
Tenagodes, II. 259.
Tenagodus, II. 259.
Terebra, II. 7, *62*, 302, 303.
  aciculata, II. 7, *62*.
 v. *acrior*, II. 8, *66*.
  benthalis, II. 8, *64*, *65*.
  cancellata, II. 66.
  casta, II. 62.
  cinerea, II. 8, *62*.
  concava, II. 8, *63*, 64.*
  dislocata, II. 8, *63*, 64.*
  flava, II. 66.
  floridana, II. 8, *63*.
  hastata, II. 8, *62*.
  jamaicensis, II. 62.
  limatula, II. 8, *63*, *66*.
 v. *lutescens*, II. 8, *63*, 65, 66.
  Metcalfei, II. 194.
  nassula, II. 8, *63*, *66*.

Terebra obesa, II. 62.
  Petitii, II. 64.
  protexta, II. 8, *63*, 65.
  rudis, II. 64.
  Rushii, II. 8, *64*, 65.
  salleana, II. 62.
  subulata, II. 62.
  triseriata, II. 63.
 v. *vinosa*, II. 8, *63*, 64.
Terebratula, I. 187, 199.
  Bartletti, I. 187, *200*.
  cubensis, I. 187, *199*, 200, 201.
  incerta, I. 187, *201*.*
  Moseleyi, I. 187, *199*.
  Murrayi, I. 202.
  scillæ, I. 201.
  siracusana, I. 201.
  sphenoidea, I. 201.
  vitrea, I. 201.
Terebratulina, I. 187, *202*.
  Cailleti, I. 187, *202*, 203; II. 350.
  caputserpentis, I. 202.
Tethys leporina, II. 453.
Thala, II. 162.
Thalotia, II. 366, 374.
Tharsis, II. 361.
Thecidium, I. 187, *204*.
  Barretti, I. 187, *205*.
  mediterraneum, I. 187, *204*.
Thetis, I. 261.
Thracia, I. 197, 284, *306*, 307, 309.
  Conradi, I. 307.
  convexa, I. 307.
  corbuloidea, I. 197, *307*.
  distorta, I. 197, *307*.
  nitida, I. 281, *283*.*
  phaseolina, I. 197, 307, *308*.
  rugosa, I. 308.
  Stimpsoni, I. 197, *307*.
Thyca crystallina, II. 287.
Tiberia, II. 29, *334*.
  nitidula, II. 334.
Tindaria, I. 192, 253, *254*; II. 438.
Torcula, II. 23, *264*.
Torinia, II. 276.
Tornatella Cumingi, II. 40, 41.
  punctata, II. 40.
  punctostriata, II. 40.
  pusilla, II. 39.
  textilis, II. 40.
Tornatina, II. 6, *44*, 45.
  bullata, II. 45.
  canaliculata, II. 45.
Tornatina Candei, II. 45.
  coix-lacryma, II. 45.
  recta, II. 45.
  spatha, II. 45.
Toxoglossa, II. *62*.
Transennella, I. 274.
Trichotropis, II. 24, 131, 132, 268, *269*.
  migrans, II. 270.
Triforis, II. 21, *242*, 243, 455.
  abrupta, II. 22, *248*, *249*.
 v. aspera, II. 21, *245*, *246*.
  bigemma, II. 21, *247*, *248*.
  colon, II. 21, *245*, *247*.
  cylindrella, II. 22, *248*, *250*.
  decorata, II. 248.
 v. *filata*, II. 22, *248*, *249*.
  hircus, II. 22, 248, *249*.
 v. *ibex*, II. 22, *248*, *249*.
  inflata, II. 22, 247, *248*, *249*.
 v. intermedia, II. 21, 244, *245*, *247*.
  lilacina, II. 21, *243*.
  longissima, II. 21, *245*, *246*.
  mirabilis, II. *243*, 245.
  modesta, II. 244.
 v. nigrocincta, II. 21, *243*, 244.
 v. *olivacea*, II. 21, *244*.
  ornata, II. 244.
  perversa, II. *243*, 245.
  ruber, II. 243.
  Rushii, II. 21, 246.
  samanæ, II. 21, *247*, *248*.
  sarissa, II. 21, *245*, *247*.
  torticula, II. 22, *248*, *249*.
  triserialis, II. 21, *245*, *246*.
  turris-thomæ, II. 21, 243, *244*.
  violacea, II. 243.
Trigona, II. 299.
Trigonia, I. 185.
Trigoniluna, I. 286.
Trigonostoma, II. 12, *129*.
  Agassizii, II. 12, *130*.
  microscopica, II. 12, *131*.
  Smithii, II. 12, *129*.
  tenera, II. 12, *129*.
Trigonulina, I. 195, *286*, 287.
  ornata, I. 195, *286*, 290.
Triptychus, II. 266, 334, 339.
  niveus, II. 339.
Tritia integra, II. 132.
Triton, II. 206, 209, 225. (See also Tritonium.)
  americanum, II. 227.
  antillarum, II. 226.

Triton brasilianum, II. 227.
  cancellinus, II. 221.
  Cantrainei, II. 208, 211.
  chlorostomum, II. 226.
  clathratum, II. 221.
  eximium, II. 180.
  eximius, II. 226.
  gracile, II. 227.
  lineolatus, II. 226.
  Martinianum, II. 227.
  nodulus, II. 226.
  obscurus, II. 226.
  parvus, II. 180, 226.
  pileare, II. 227.
  pulchellus, II. 226.
  pyriformis, II. 226.
  Swiftii, II. 226.
  tuberosum, II. 226.
  Veliei, II. 227.
  vespaceus, II. 227.
Tritonidea, II. 15, *177*, 183, 213.
  auritula, II. 177.
  cancellaria, II. 129, *177*.
  coromandeliana, II. 177.
  D'Orbignyi, II. 177.
  floridana, II. 177.
  Haneti, II. 177.
  lauta, II. 177.
  limbata, II. 15, 165, 175, *177*.
  ringens, II. 177.
  tincta, II. 177.
  variegata, II. 177.
  viverratoides, II. 177.
Tritonium, II. 19, 209, 212, 221, *225*, 228.
  cynocephalus, II. 226.
  femorale, II. 228.
  gemmatum, II. 228.
  labiosum, II. 228.
  lanceolatum, II. 225.
  Loebbeckii, II. 228.
  Loroisii, II. 228.
  maculosum, II. 225.
  v. nobilis, II. 225.
  olearium, II. 226.
  Poulsenii, II. 228.
  rubecula, II. 228.
  tritonis, II. 225.
  vespaceus, II. 228.
Trivia, II. 21, *240*.
  v. alba, II. 241.
  approximans, II. 241.
  armandina, II. 240.
  candidula, II. 21, *240*.
Trivia cimex, II. 240.
  globosa, II. 21, *241*.
  labiosa, II. 240.
  nivea, II. 21, *240*.
  olorina, II. 241.
  oryza, II. 240.
  pediculus, II. 21, *240*.
  pilula, II. 241.
  pullata, II. 240.
  v. rotunda, II. 21, *241*.
  sphærula, II. 241.
  subrostrata, II. 21, *240*.
  suffusa, II. 21, *240*.
Trochatella, II. 286.
Trochita, II. *285*, 286.
Trochocochlea monocingulata, II. 269.
Trochus ægleis, II. 380, 381.
  amabilis, II. 378.
  cancellatus, II. 361.
  cinctus, II. 379, 382.
  clavatus, II. 380.
  conchyliophorus, II. 290.
  conulus, II. 363.
  fulgidus, II. 393.
  infundibulum, II. 380.
  javanicus, II. 369.
  jujubinus, II. 369.
  Ottoi, II. 380, 381.
  peregrinus, II. 380.
  perversus, II. 243.
  pulcher, II. 366.
  punctatus, II. 252, 253.
  rhina, II. 380.
  rhysus, II. 380.
  Schrammi, II. 387.
  solarioides, II. 358.
  tiara, II. 365.
  Vaillanti, II. 381.
  zonamestus, II. 369.
Trophon, II. 18, 199, 200, 202, 203, *204*, 205, 206, 209, 210, 212, 291.
  aculeatus, II. 205, 206.
  clavatus, II. 205, 206.
  coronatus, II. 204.
  Dalli, II. 204.
  Gerversianus, II. 204, 205.
  Gooderichii, II. 204.
  Goodridgei, II. 204.
  Lintoni, II. 205, 219.
  Mörchii, II. 128.
  multilamellosa, II. 205.
  muriciformis, II. 204.
  vaginatus, II. 205.

Tropidomya, I. 197, *301.*
  abbreviata, I. 197, 302.
Tropidophora, I. 301.
Trubatsa, II. 18, *215.*
Tubiola, II. 386.
  divisa, II. 394.
Tugurium, II. 26, *291.*
Tulotoma, II. 378.
Turbinella pyrum, II. 156.
Turbo Briareus, II. 388.*
  carinatus, II. 352.
  clathrus, II. 299, 302, 305.
  decussatus, II. 281.
  delphinus, II. 304.
  filosus, II. 352.
  indutus, II. 352.
  lacteus, II. 335.
  mammilla, II. 352.
  moniliferus, II. 379.
  pulchella, II. 351.
  sanguineus, II. 351.
  scalaris, II. 299, 301, 303, 304, 305.
Turbona, II. 299, 300, 301.
Turbonella, II. 335.
Turbonilla, II. 29, 304, *335*, 338, 339.
  belotheca, II. 29, *335.*
  curta, II. 29, *337.*
  flavocincta, II. 29, *336.*
  v. fulvocincta, II. 29, *336*, 337.*
  paucistriata, II. 336.
  punicea, II. 336.
  pusilla, II. 29, *337.*
  Riisei, II. 336.
  rufa, II. 336.
  Smithii, II. 338.
  virga, II. 336.
  viridaria, II. 336.
Turcicula, II. 32, 341, 350, *376*,* 456.
  Bairdii, II. 341,* *378.**
  imperialis, II. 32, *376.*
Turricula, II. 157, 159, 160, 163.
Turris, II. 161.
  candida, II. 72.
  virgo, II. 72.
Turritella, II. 23, *264*, 266, 274, 302, 303.
  acropora, II. 23, *264.*
  alternata, II. 257.
  costulata, II. 307.
  exoleta, II. 23, *264*, 265.
  gregaria, II. 301.
  imbricata, II. 23, *265.*
  interrupta, II. 336.
  pagoda, II. 265.
Turritella variegata, II. 265.
  yucatecana, II. 265.
Tylodina, II. 60.
  excentrica, II. 344.
Typhis, II. 18, 194, 201, *214*, 215,* 216.
  alatus, II. 215.
  arcuatus, II. 215, 216.
  cancellatus, II. 215.
  duplicatus, II. 215.
  expansus, II. 215.
  fistulosus, II. 215, 216.
  floridanus, II. 18, *216.*
  japonicus, II. 215.
  longicornis, II. 18, *216.*
  Sowerbyi, II. 215.
  tetrapterus, II. 215, 216.
Typhlomangilia lithocolleta, II. 95.
  Tanneri, II. 125.

Umbella, II. 60.
Umbonium, II. 31, 356, *358.*
  Bairdii, II. 31, *359*, 378.
Umbraculum, II. 7, *59*, 61.
  bermudense, II. 7, *60.*
  mediterraneum, II. 60.
  umbrella, II. 60.
Umbrella, II. 59, 60.
Unio, II. 456.
Unionum, II. 374.
Urosalpinx, II. 18, 211, *214.*
  carolinensis, II. 18, 166, 170, *214.*
  cinereus, II. 18, 211, *214.*
  floridanus, II. 212.
  macra, II. 18, 214.
  perrugatus, II. 18, 166, 212, *214.*
  tampaënsis, II. 18, 210, *214.*
Utriculus, II. 6, *45*, 46, 455.
  biplicatus, II. 46.
  conulus, II. 49.
  domitus, II. 6, 45, *47*, 48.
  Frielei, II. 6, 45, *47.*
  Gouldii, II. 45.
  leucus, II. 47.
  Mayoi, II. 6, 45, *46.*
  oliviformis, II. 48.
  pertenuis, II. 45.
  pervius, II. 6, 45, *48.*
  spatha, II. 48.
  vortex, II. 6, 45, *47*, 48.

Valvata, II. 299, 304.
Veneriglossa, I. 194, *275* ; II. 440.
  coniformis, II. 440.

- *Veneriglossa vesica*, I. 194, *275*.
- Venilia, II. 328.
- Venus, I. 194, *276*.
  - cancellata, I. 194, *276*.
  - coniformis, II. 440.
  - cubaniana, I. 260.
  - dysera, I. 276.
  - inæquivalvis, I. 276.
  - pilula, I. 194, *276*.
  - pygmæa, I. 194, *276*.
  - trapezoidalis, I. 276.
- Vermetus, II. 23, 260, 261, *262*, 263.
  - Adansonii, II. 453.
  - *erectus*, II. 23, *262*, 263.*
  - irregularis, II. 261.
  - lumbricalis, II. 261.
  - nigricans, II. 261, 262.
  - radicula, II. 453.
  - spiratus, II. 453.
  - varians, II. 261.
- Vermicularia, II. 23, *260*, 261, 264.
  - Adansonii, II. 453.
  - lumbricalis, II. 23, *261*, 262, 453.
  - *nigricans*, II. 23, *261*,* 262.
  - radicula, II. 453.
  - spirata, II. 453.
- Vertagus Kochii, II. 259.
- Verticordia, I. 195, 280,* 281,* *285*,* 286, 287, 288; II. 437,* 441,* 445, 449, 450.
  - acuticostata, I. 195, 285,* 286, *288*; II. 446.
  - australiensis, I. 290.
  - cælata, I. 286, *290*.
  - cardiiformis, I. 286.
  - Deshayesiana, I. 286.
  - *elegantissima*, I. 196, 286, *291*; II. 440.
  - *Fischeriana*, I. 287, *291*.
  - flexuosa, I. 286.
  - granifera, I. 286.
  - granulata, I. 287, 292.
  - japonica, I. 286.
  - novemcostata, I. 286.
  - orbiculata, I. 267.
  - ornata, I. 195, *290*.
  - parisiensis, I. 286.
  - *perversa*, I. 195, 286, *289*; II. 440.
  - *Seguenzæ*, I. 195, 286, *290*.
  - tornata, I. 286; II. 446.
  - trapezoidea, I. 287, 290, 291, 292.
  - Woodii, I. 195, 286, *289*.
- *Vesicomya*, I. 194, *272*; II. 439.
- Vesicomya atlantica, I. 194, *274*, 275.
  - cytherioides, II. 439.
  - *pilula*, I. 194.
  - *Smithii*, II. 439.
  - subquadrata, I. 194.
  - *venusta*, I. 194; II. 439.
- Viriola, II. 250.
- Vitrinella, II. 33, 222, *359*, 360, 361, *392*, 394.
  - gemma, II. 393.
  - *Holmesii*, II. 33, *360*, *392*.
  - *multicarinata*, II. 33, 273, 361, *392*.
  - valvatoides, II. 359.
- Vivipara, II. 304, 305, 378.
- Volusia, II. 331.
- Voluta, II. 13, *146*, 453.
  - angulata, II. 144.
  - chlorosina, II. 147.
  - costata, II. 145.
  - demissa, II. 144.
  - dubia, II. 151.
  - floridana, II. 144.
  - fulva, II. 147.
  - Gouldiana, II. 154.
  - hebræa, II. 146.
  - jaspidea, II. 134.
  - junonia, II. 144, *148*, 156.
  - Lamberti, II. 145.
  - mississippiensis, II. 145.
  - muricina, II. 150.
  - musica, II. 13, 144, 145, *146*, 149.
  - mutabilis, II. 144, 150, 151.
  - Newcombiana, II. 144.
  - obtusa, II. 144.
  - pallida, II. 142.
  - polyzonalis, II. 147.
  - pusio, II. 147.
  - reticula, II. 129.
  - solitaria, II. 144.
  - Stearnsii, II. 155.
  - Trenholmii, II. 144.
  - vespertilio, II. 148.
  - vexillum, II. 148, 155.
  - virescens, II. 13, *146*, 147.
- Volutella, II. 13, 136, *142*.
  - agger, II. 143.
  - *amianta*, II. 13, *143*.
  - *hadria*, II. 13, *142*, 143.
  - lacrimula, II. 13, *142*.
  - ovuliformis, II. 143.
- Volutidæ, II. 144.
- Volutifusus, II. 150.
  - dubius, II. 151.

Volutilithes, II. 144, 145.
Volutolyria, II. 146.
Volutopsis, II. 452.
Volutomitra grönlandica, II. 145.*
  wandoensis, II. 160.
Volvaria pallida, II. 142.
Volvarina, II. 13, 136, *141*.
  albolineata, II. 13, *141*.
  avena, II. 13, *141*, 142.
  v. guttula, II. 13, *141*.
  pallida, II. 13, *142*.
  subtriplicata, II. 13, *142*.
  varia, II. 141, 142.
Volvula, II. 6, *50*.
  acuminata, II. 50.
  acuta, II. 6, *50*.
  aspinosa, II. 6, *51*.
  Bushii, II. 6, 51.
  eburnea, II. 55.
  minuta, II. 50.
  oxytata, II. 6, *50*.
  persimilis, II. 50.
  recta, II. 50.
Vulcanomya, I. 196, *299*.
  Smithii, I. 196, *299*.

Waldheimia, I. 202.
  floridana, I. 202.
Williamia Gussoni, II. 290.
  Krebsii, II. 290.

Xenophora, II. 26, *290*.
  caperata, II. 291.
  caribæa, II. 26, 290, *291*.*
  conchyliophora, II. 26, *290*.
Xylophaga, I. 198, *317*, 318.
  abyssorum, I. 198, *317*.

Yoldia, I. 191, *248*, 253.
  liorhina, I. 191, *248*.
  solenoides, I. 191, *248*.

Zierliana, II. 163.
Zizyphinus, II. 363.
  euglyptus, II. 363.
  tiara, II. 365.
Zoölogical Miscellany, II. 375.

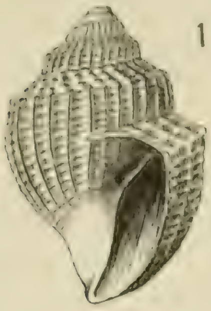
June 8, 1889.

PLATE X.

Fig. 1. *Gymnobela Blakeana* Dall; 8.25. Page 126.
" 2. *Gymnobela extensa* Dall; 12.25. Page 126.
" 3. *Mangilia bandella* Dall; 9.37. Page 116.
" 4. *Mangilia antonia* Dall; 5.75. Page 116.
" 5. *Leucosyrinx Verrillii* Dall; 36.0. Page 75.
" 6. *Drillia polytorta* Dall; 33.5. Page 85.
" 7. *Drillia acestra* Dall; 19.0. Page 87.
" 8. *Drillia albicoma* Dall; 25.7. Page 83.
" 9. *Pleurotomella Emertonii* Verrill & Smith; 34.0. Page 122.
" 10. *Daphnella reticulosa* Dall; 11.5. Page 103.
" 11. *Daphnella sofia* Dall, outer lip imperfect; 8.0. Page 107.
" 12. *Mangilia? scipio* Dall, outer lip imperfect; 14.0. Page 117.

NOTE.—The figures denote the actual length in millimeters of the longest diameter of the specimens as figured, whether that be the height or the breadth, except where otherwise stated.

PLATE X.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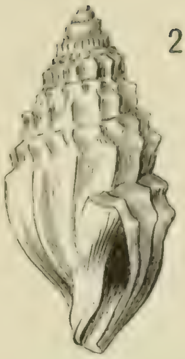
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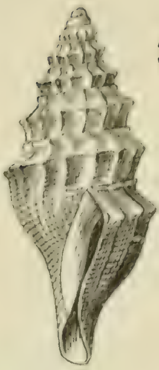
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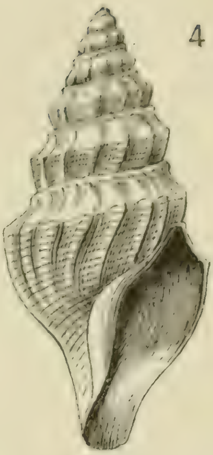
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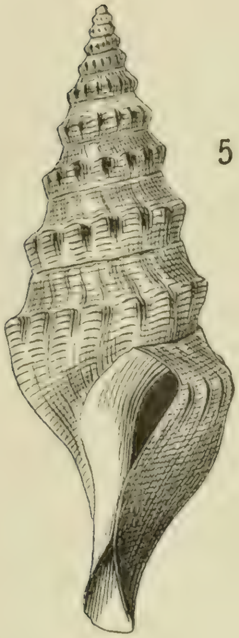
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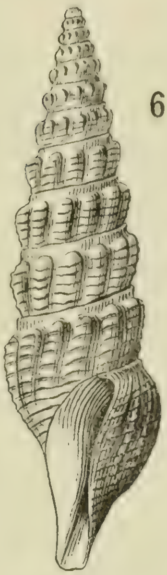
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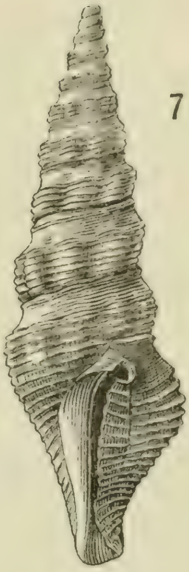
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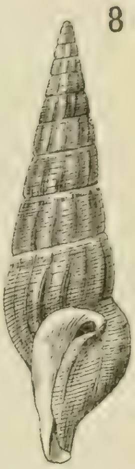
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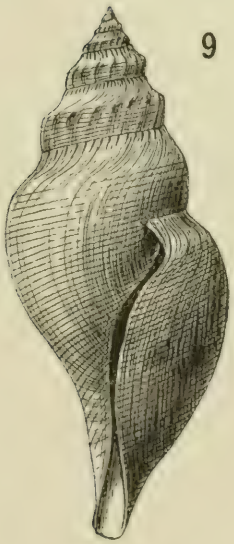
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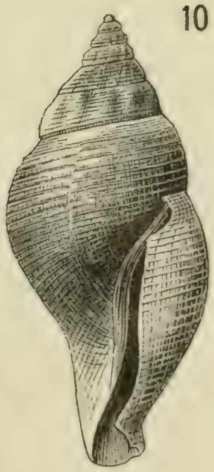
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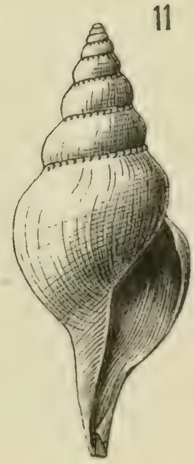
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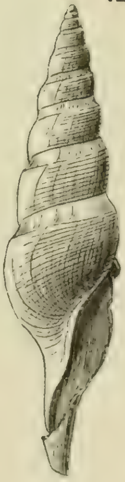
12

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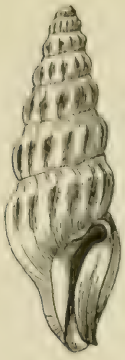
PLATE XI.

Fig. 1. *Drillia nucleata* Dall ; 13.5. Page 92.
" 2. *Drillia Verrillii* Dall ; 5.5. Page 93.
" 3. *Drillia lissotropis* Dall, young ; 4.5. Page 91.
" 4. *Drillia lissotropis* Dall, adult ; 7.0. Page 91.
" 5. *Drillia havanensis* Dall ; 9.0. Page 93.
" 6. *Drillia lithocolleta* Watson, young ; 12.5. Page 95.
" 7. *Drillia smirna* Dall ; 15.0. Page 94.
" 8. *Drillia oleacina* Dall ; 10.0. Page 94.
" 9. *Mangilia pelagia* Dall ; 10.75. Page 117.
" 10. *Leucosyrinx Sigsbeei* Dall ; 25.5. Page 76.
" 11. *Mangilia antonia* Dall, young ; 7.0. Page 116.
" 12. *Mangilia comatotropis* Dall ; 6.0. Page 116.
" 13. *Pleurotomella leucomata* Dall ; 13.5. Page 120.
" 14. *Mangilia ipara* Dall ; 8.5. Page 115.
" 15. *Mangilia quadrata* var. *monocingulata* Dall ; 6.75. Page 114.
" 16. *Mangilia quadrata* var. ; 7.0. Page 114.
" 17. *Mangilia peripla* Dall ; 8.0. Page 115.
" 18. *Drillia premorra* Dall ; 9.5. Page 93.

PLATE XI.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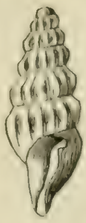
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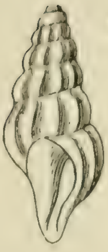
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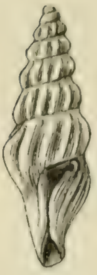
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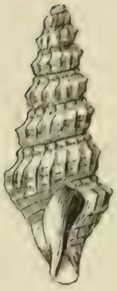
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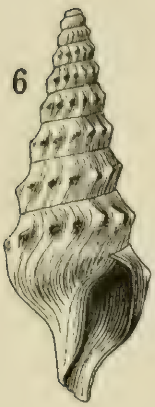
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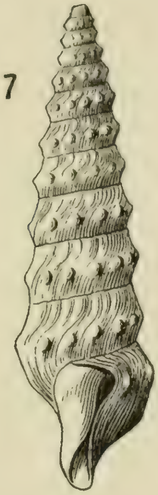
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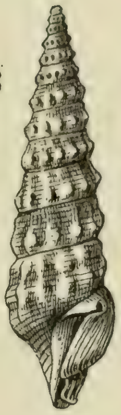
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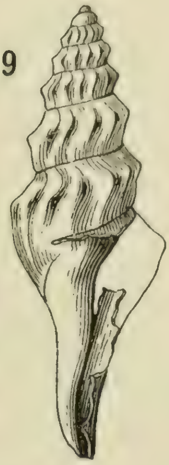
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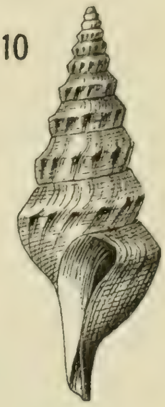
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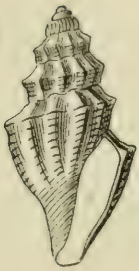
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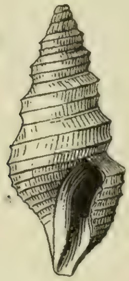
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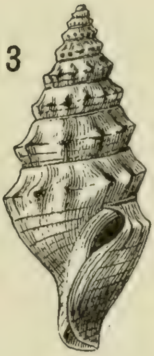
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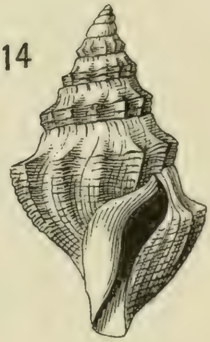
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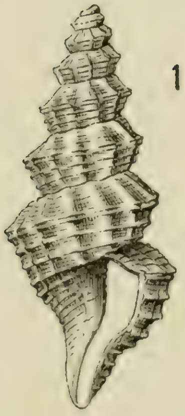
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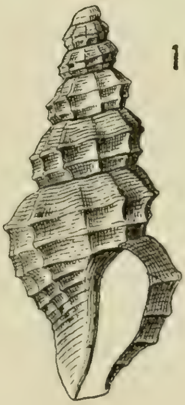
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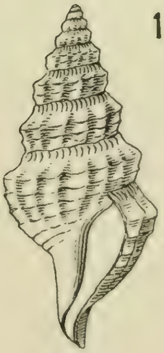
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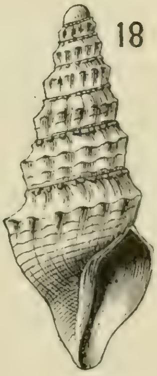
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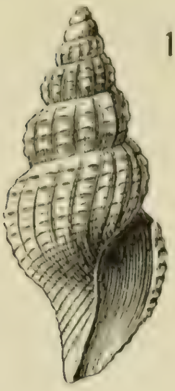
PLATE XII.

Fig. 1. *Daphnella morra* Dall ; 5.75. Page 105.
“ 2. *Drillia pharcida* Dall ; 9.5. Page 88.
“ 3. *Mangilia ? subsida* Dall ; 13.0. Page 118.
“ 4. *Cythara cymella* Dall ; 13.0. Page 101.
“ 5. *Genota mitrella* Dall ; 12.5. Page 79.
“ 6. *Cythara Bartlettii* Dall, adult ; 8.0. Page 101.
“ 7. *Mangilia elusiva* Dall ; 9.25. Page 115.
“ 8. *Mangilia toreumata* Dall ; 10.5. Page 118.
“ 9. *Pleurotomella filifera* Dall ; 17.5. Page 123.
“ 10. *Glyphostoma gratula* Dall, young ; 17.5. Page 110.
“ 11. *Drillia detecta* Dall ; 11.75. Page 84.
“ 12. *Ancistrosyrinx radiata* Dall ; 13.0. Page 78.

PLATE XII.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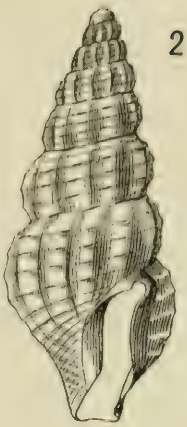
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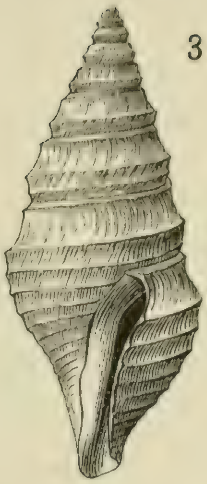
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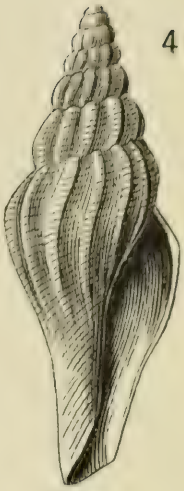
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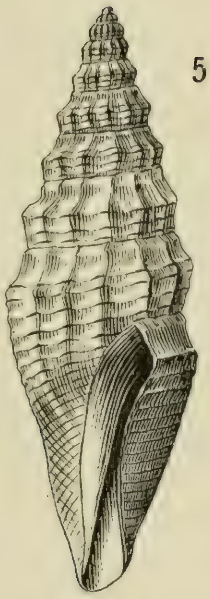
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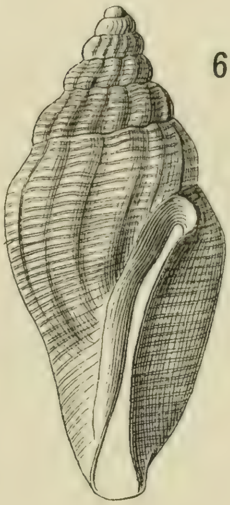
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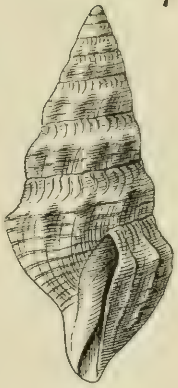
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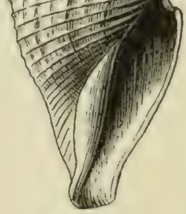
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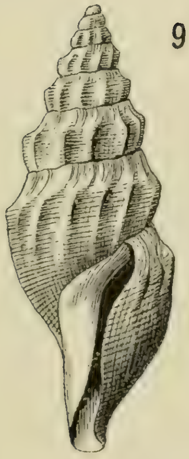
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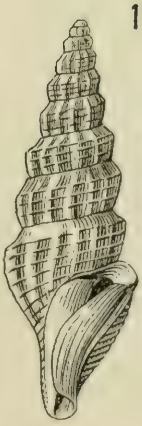
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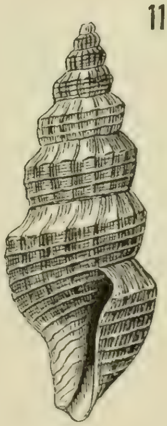
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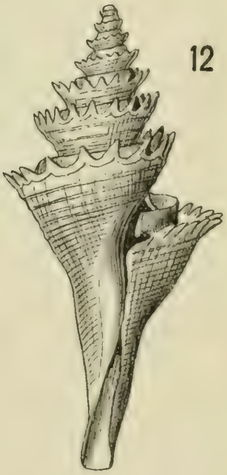
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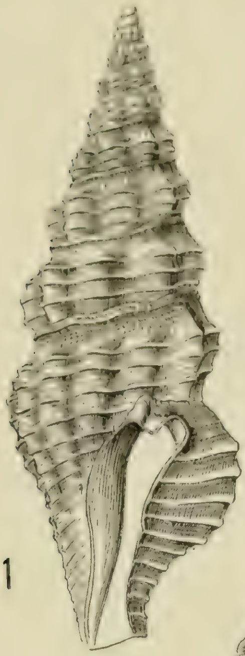
PLATE XIII.

Fig. 1. *Drillia eucosmia* Dall; 19.0. Page 86.
“ 2. *Genota (Dolichotoma) viabrunnea* Dall; 38.0. Page 80.
“ 3. *Drillia haliostrephis* Dall; 20.0. Page 86.
“ 4. *Glyphostoma Gabbii* Dall, young; 9.5. Page 108.
“ 5. *Glyphostoma Gabbii* Dall, young; 9.5. Page 108.
“ 6. *Drillia pagodula* Dall; 13.5. Page 90.
“ 7. *Glyphostoma Gabbii* Dall, adult; 19.0. Page 108.
“ 8. *Glyphostoma Gabbii* Dall, young; 16.0. Page 108.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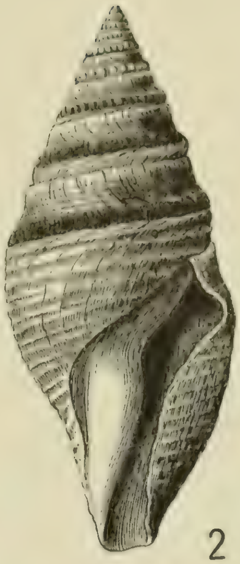
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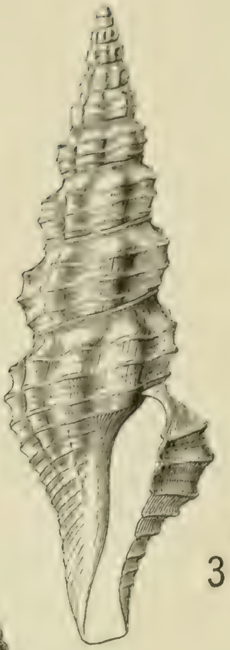
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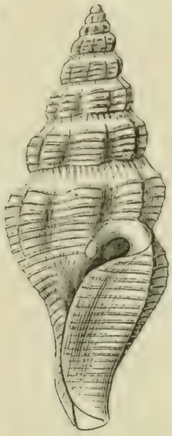
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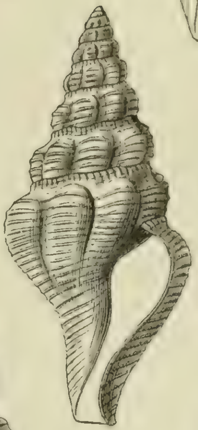
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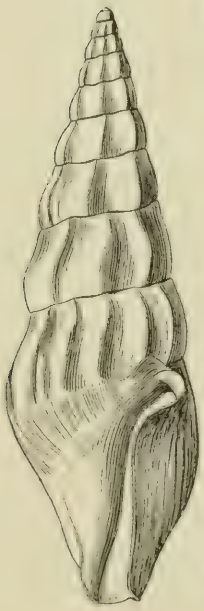
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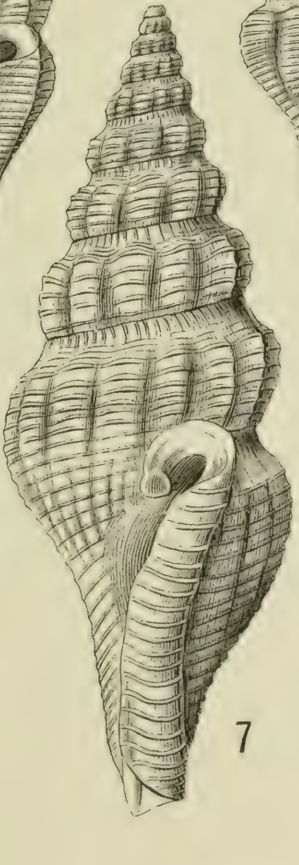
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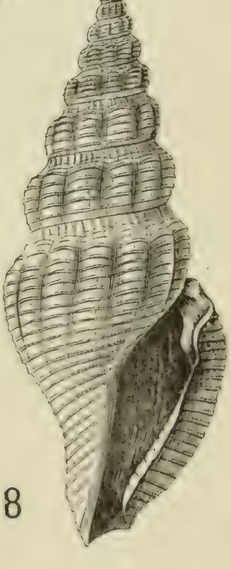
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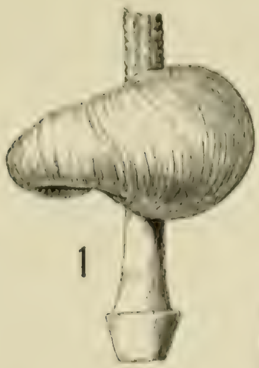
PLATE XIV.

Fig. 1. *Amalthea benthophila* Dall, on spine of Echinoderm, viewed from above ; 8.0. Page 289.
" 1 a. *Amalthea benthophila* Dall, from the right ; 8.0. Page 289.
" 1 b. *Amalthea benthophila* Dall, from below ; 8.0. Page 289.
" 2. *Loripes compressa* Dall ; 11.0. Part I., page 266.
" 3. *Capulus* (*Hyalorisia*) *galea* Dall, from below ; 18.5. Page 288.
" 3 a. *Capulus* (*Hyalorisia*) *galea* Dall, profile ; 18.5. Page 288.
" 4. *Pleurotomella Packardii* var. *Benedicti* V. & S. ; 11.0. Page 119.
" 5. *Cythara Bartlettii* Dall, nearly adult ; 10.0. Page 101.
" 6. *Glyphis fluviana* Dall, from below ; 10.6. Page 408.
" 6 a. *Glyphis fluviana* Dall, profile ; 10.6. Page 408.
" 7. *Daphnella corbicula* Dall ; 11.2. Page 103.
" 8. *Cythara Bartlettii* Dall, young ; 10.0 ; Page 101.
" 9. *Umbraculum bermudense* Mörch ? young shell ; 10.0. Page 60.
" 10. *Umbraculum bermudense* Mörch ? profile ; 10.0. Page 60.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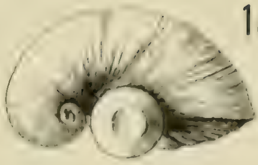
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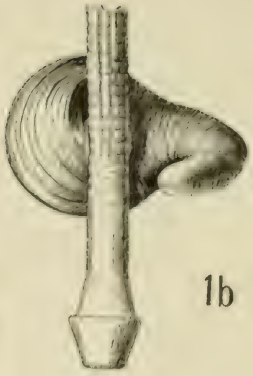
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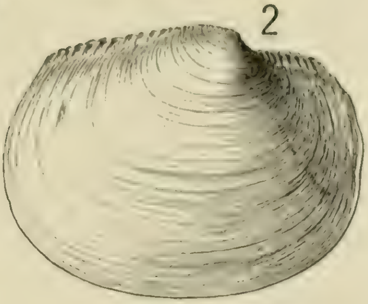
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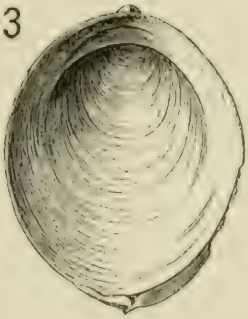
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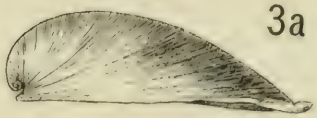
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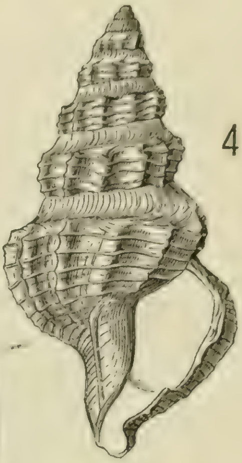
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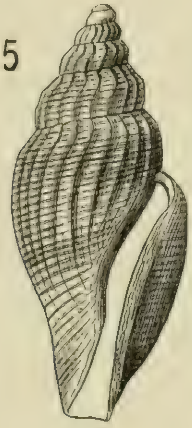
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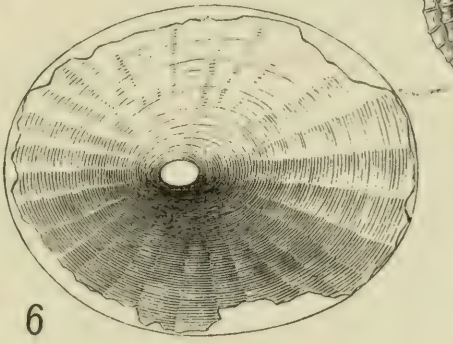
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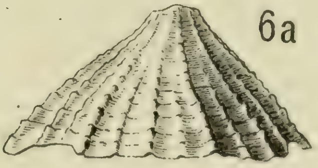
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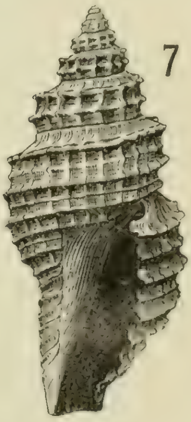
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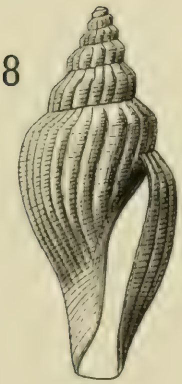
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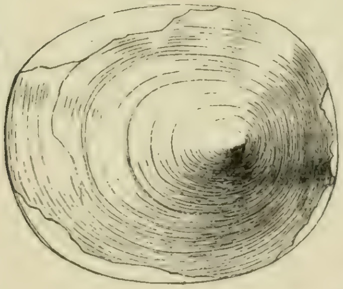
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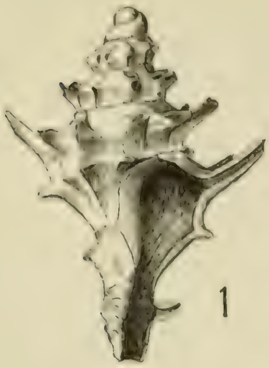
PLATE XV.

Fig. 1. *Murex Pazi* Crosse, young shell ; 7.5. Page 199.
" 2. *Trophon ? actinophorus* Dall ; 17.5. Page 206.
" 3. *Pteronotus tristichus* Dall ; 15.5. Page 202.
" 4. *Trophon lacunella* Dall ; 41.0. Page 205.
" 5. *Dolium (Eudolium) Crosseanum* Monterosato; 35.0. Page 232.
" 6. *Mitra (Costellaria ?) styria* Dall ; 19.0. Page 159.
" 7. *Typhis (Trubatsa) longicornis* Dall, young ; 7.5. Page 216.
" 8. *Mitra (Thala ?) torticula* Dall ; 12.2. Page 162.
" 9. *Mangilia ? exsculpta* Watson ; 30.0. Page 117.
" 10. *Fusus benthalis* Dall ; 15.0. Page 168.
" 11. *Fusus amiantus* Dall ; 17.0. Page 169.
" 12. *Nassarina Bushii* Dall ; 9.0. Page 182.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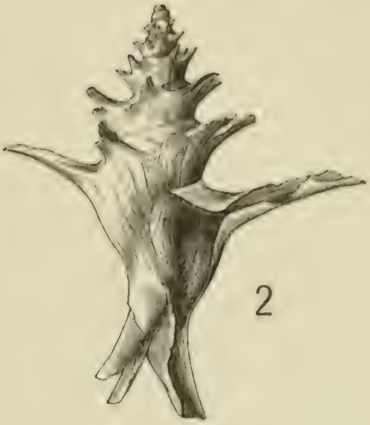
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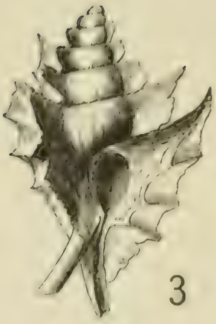
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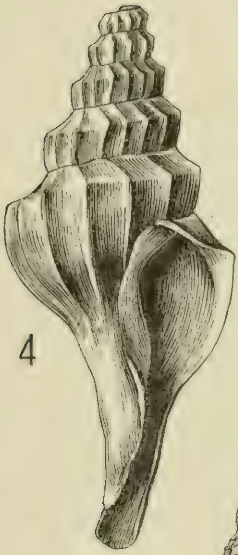
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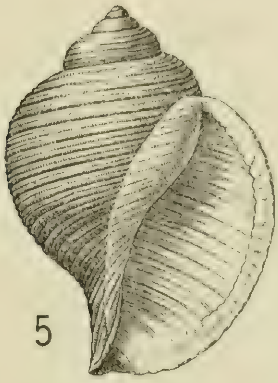
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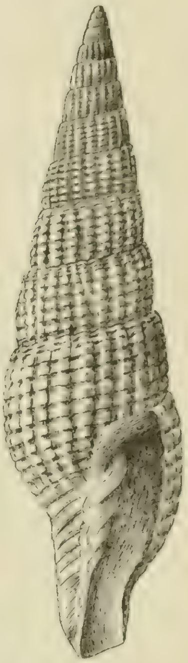
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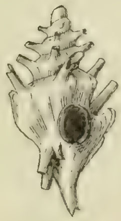
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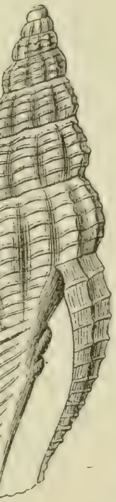
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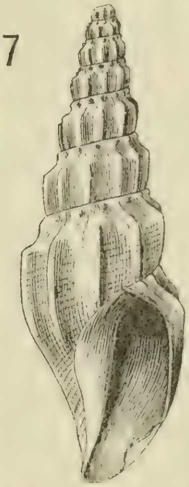
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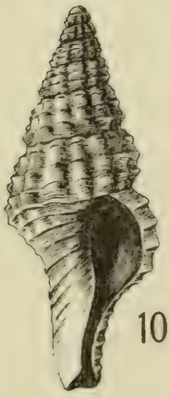
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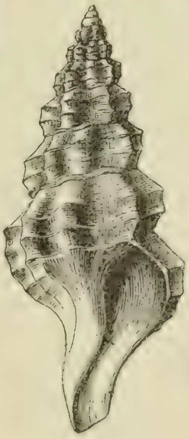
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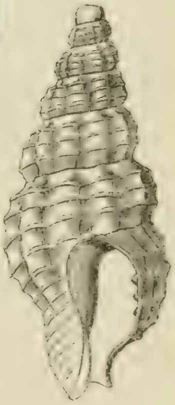
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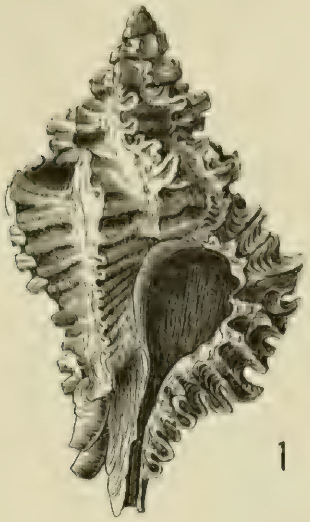
PLATE XVI.

Fig. 1. *Ocinebra* (*Favartia*) *cellulosa* Conrad, young ; 12.0. Page 210.
" 2. *Murex pomum* Gmelin, very young ; 15.0. Page 198.
" 3. *Murex Hidalgoi* Crosse ; 23.0. Page 198.
" 4. *Murex hystricina* Dall ; 21.0. Page 200.
" 5. *Coralliophila Deburghiæ* Reeve, young ; 20.0. Page 218.
" 6. *Coralliophila lactuca* Dall, young ; 11.0. Page 220.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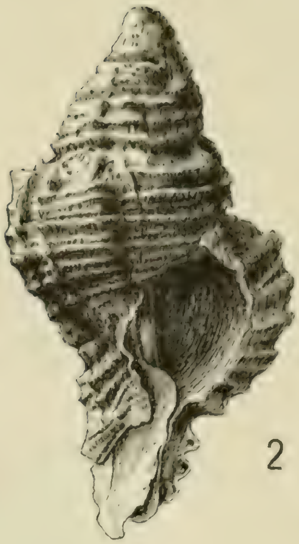
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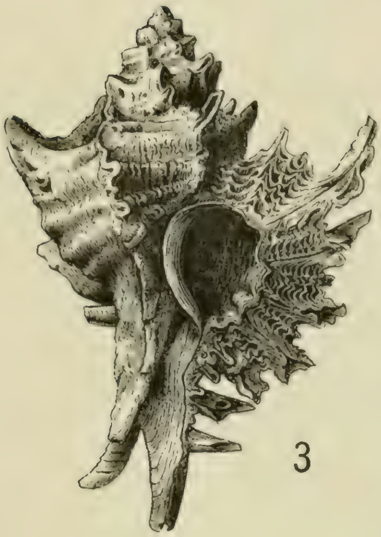
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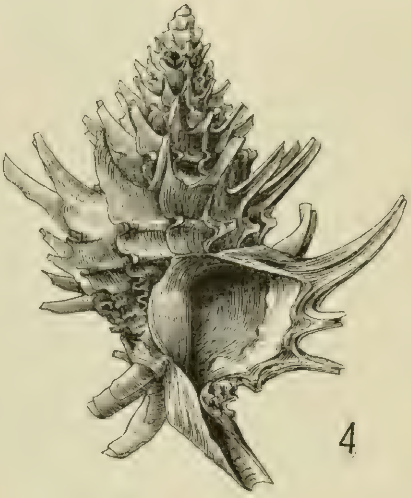
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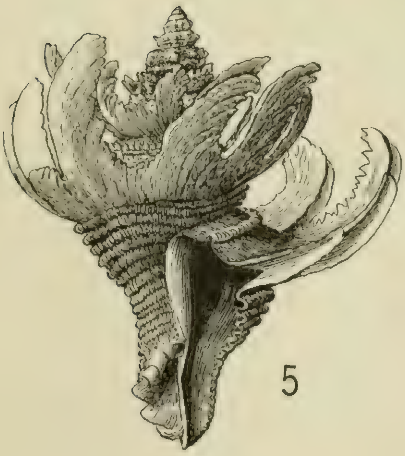
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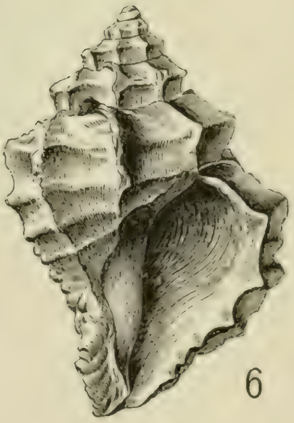
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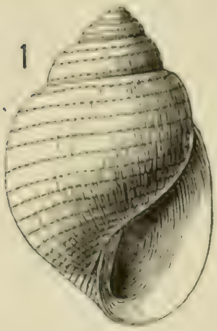
PLATE XVII.

Fig. 1. *Actæon incisus* Dall ; 9.0. Page 42.
" 1 b. *Actæon incisus* Dall var., adolescent ; 6.8. Page 42.
" 2. *Actæon melampoides* Dall ; 6.0. Page 41.
" 3. *Utriculus vortex* Dall ; 7.5. Page 47.
" 4. *Utriculus Frielei* Dall ; 8.2. Page 47.
" 5. *Actæon delicatus* Dall ; 10.0. Page 41.
" 6. *Bulla eburnea* Dall ; 7.25. Page 55.
" 7. *Atys ? Sandersoni* Dall ; 6.5. Page 54.
" 8. *Utriculus* (*vortex* var.?) *domitus* Dall ; 9.0. Page 47.
" 9. *Sabatia bathymophila* Dall, adult ; 16.5. Page 53.
" 9 b. *Sabatia bathymophila* Dall, adolescent ; 10.0. Page 53.
" 10. *Scaphander Watsoni* Dall ; 8.75. Page 52.
" 11. *Bulla abyssicola* Dall ; 12.75. Page 56.
" 12. *Actæon Danaida* Dall ; 11.0. Page 42.

PLATE XVII.

1



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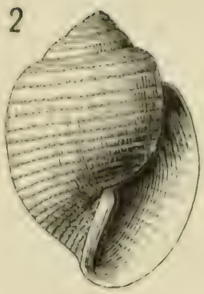

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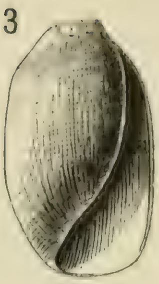

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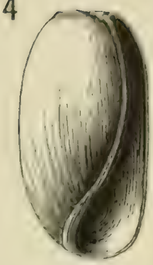

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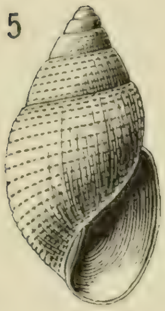

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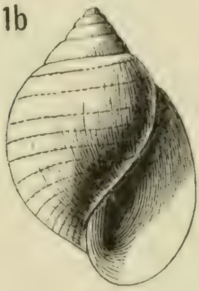

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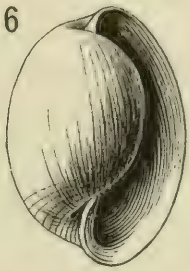

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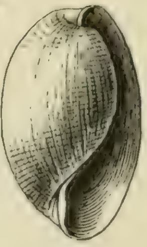

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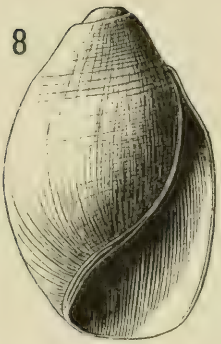

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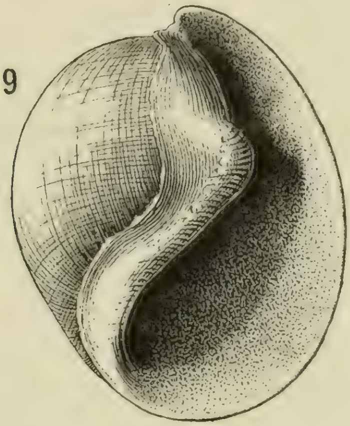

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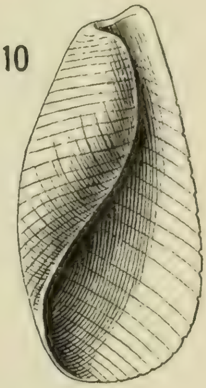

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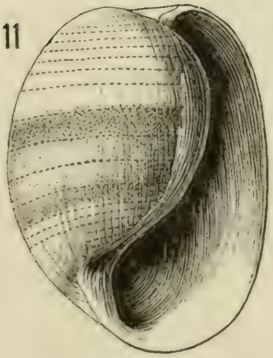

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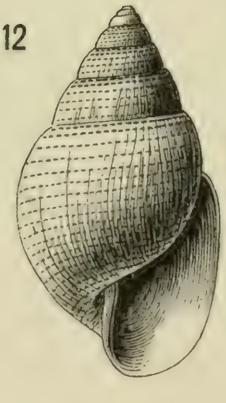

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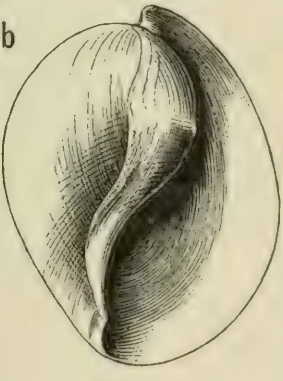

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PLATE XVIII.

Fig. 1. *Scala hellenica* var. *Mörchiana* Dall ; 6.87. Page 322.
" 2. *Scala discobolaria* Dall ; 6.5. Page 324.
" 3. *Actæon perforatus* Dall ; 7.75. Page 42.
" 4. *Scala aurifila* Dall ; 11.0. Page 322.
" 5. *Niso interrupta* Sowerby var. *albida* Dall ; 8.1. Page 330.
" 6. *Niso interrupta* var. *albida* Dall, base ; 3.5. Page 330.
" 7. *Aclis nucleata* Dall ; 9.3. Page 325.
" 8. *Aclis lata* Dall ; 5.5. Page 324.
" 9. *Scala contorquata* Dall ; 4.7. Page 318.
" 10. *Scala polacia* Dall, aperture imperfect ; 7.25. Page 319.
" 11. *Scala formosissima* Jeffreys ; 8.5. The aperture is a little distorted where it joins the body whorl. Page 319.
" 11 b. *Scala belaurita* Dall ; 8.3. Page 316.
" 12. *Aclis egregia* Dall ; 13.0. Page 325.

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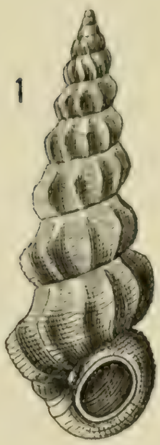

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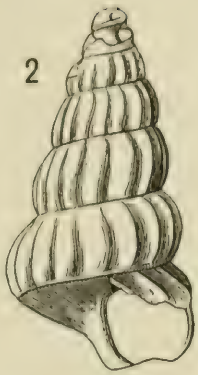

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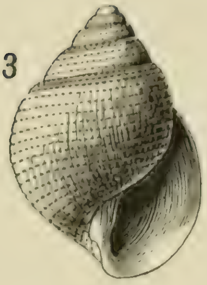

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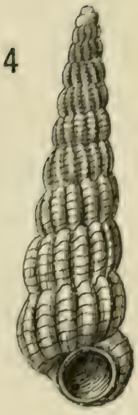

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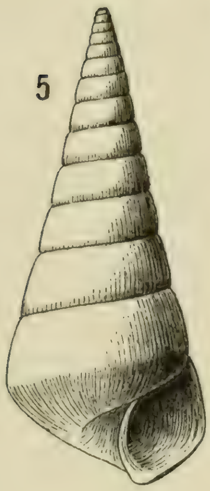

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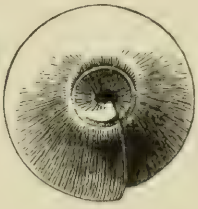

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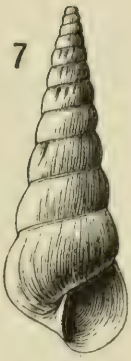

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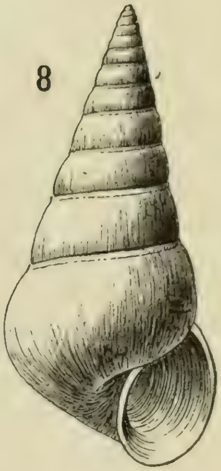

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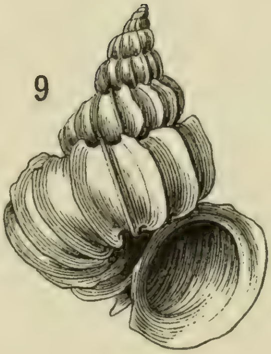

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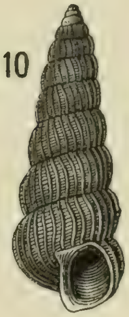

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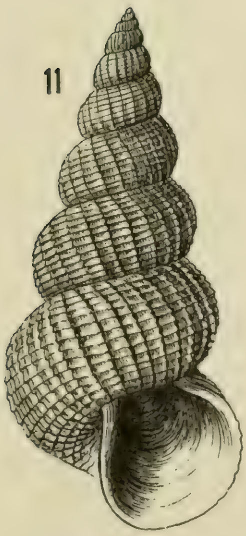

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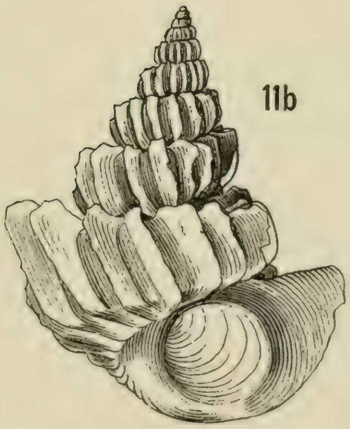

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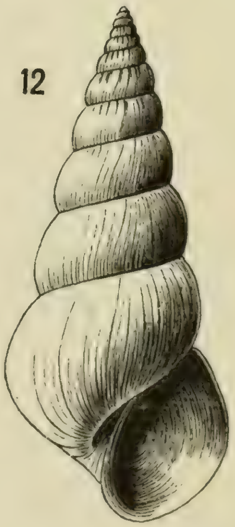

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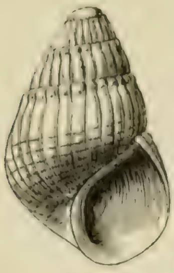
PLATE XIX.

Fig. 1. *Rissoa precipitata* Dall ; 4.0. Page 279.
“ 2. *Marginella seminula* Dall ; 7.0. Page 139.
“ 3. *Marginella Watsoni* Dall ; 9.5. Page 137.
“ 4. *Marginella fusina* Dall ; 8.0. Page 138.
“ 5. *Marginella yucatecana* Dall ; 5.62. Page 138.
“ 6. *Marginella succinea* Conrad ; 12.0. Page 139.
“ 7. *Marginella torticula* Dall ; 11.5. Page 141.
“ 8. *Columbella* (*Astyris ?*) *Verrillii* Dall ; 9.0. Page 192.
“ 9 a. *Pedicularia decussata* Gould, profile ; 6.0. Page 237.
“ 9 b. *Pedicularia decussata*, young, showing spiral apex ; 2.5. Page 238.
“ 10. *Rissoa xanthias* Watson var. *acuticostata* Dall ; 3.7. Page 280.
“ 10 b. *Eucosmia brevis* Orbigny ; 2.0. Page 351.
“ 10 c. *Columbella* (*Anachis*) *amphissella* Dall ; 4.0. Page 188.
“ 10 d. *Dalium solidum* Dall ; 41.0. Page 230.
“ 11. *Eulima* (*Melanella*) *arcuata* C. B. Adams ; 4.0. Page 328.
“ 11 b. *Leiostraca fusus* Dall ; 13.5. Page 329.
“ 11 c. *Eulimella unifasciata* Forbes ; 6.0. Page 338.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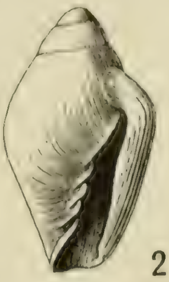
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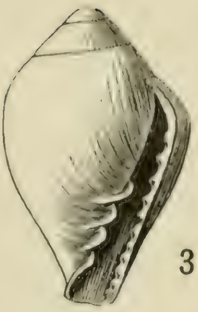
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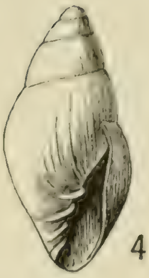
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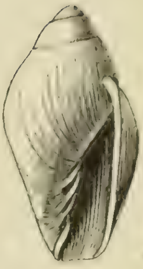
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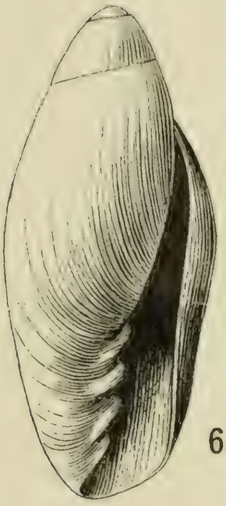
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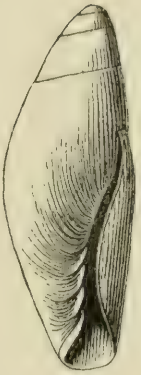
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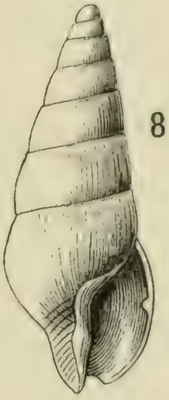
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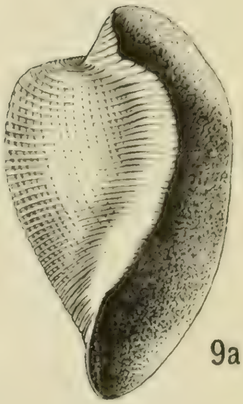
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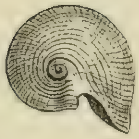
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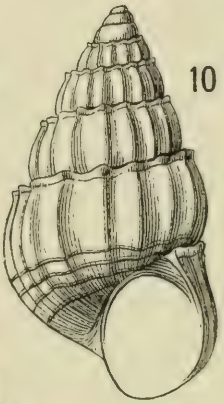
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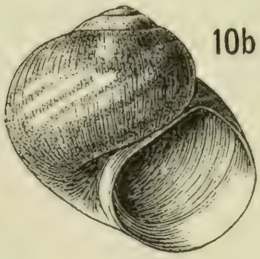
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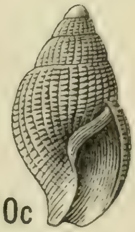
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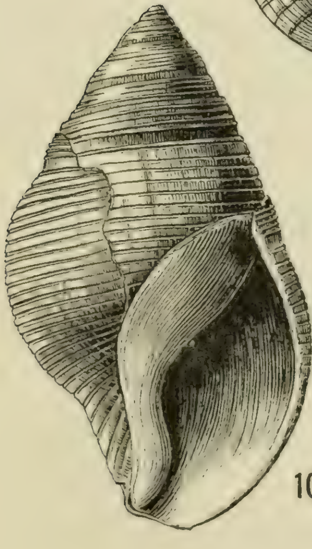
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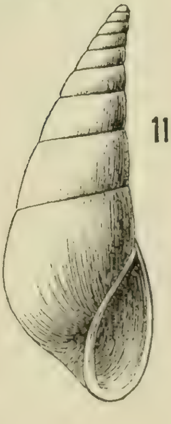
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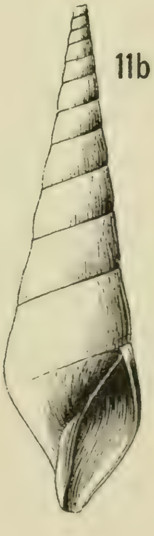
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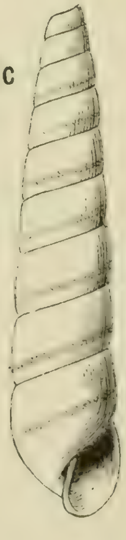
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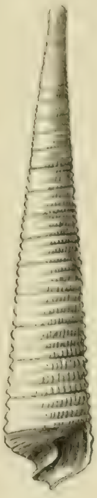
PLATE XX.

Fig. 1. *Cerithiopsis Sigsbeeana* Dall; 10.5. Page 254.
" 2. *Cerithiopsis Martensii* Dall ; 11.25. Page 255.
" 3. *Cerithiopsis crystallina* Dall ; 16.0. Poor figure. Page 254.
" 4. *Cerithiopsis* (*Eumeta ?*) *subulata* Montagu ; 14.25. Page 252.
" 5. *Cerithiopsis abrupta* Watson ; 4.3. Page 257.
" 5 a. *Triforis triserialis* Dall ; 8.25. Page 246.
" 6. *Triforis cylindrella* Dall ; 6.5. Page 250.
" 6 a. *Triforis triserialis* Dall ; 15.5. Page 246.
" 7. *Mathilda yucatecana* Dall ; 8.0. Page 266.
" 8. *Triforis triserialis* var. *intermedia* Dall ; 11.0. Page 247.
" 9. *Triforis abrupta* Dall ; 7.5. Page 249.
" 10. *Triforis longissima* Dall ; 26.0. Page 246.
" 11. *Triforis bigemma* var. *hircus* Dall ; 12.5. Page 249.
" 11 b. *Triforis torticula* Dall ; 10.5. Page 249.
" 12. *Triforis colon* Dall ; 12.0. Page 247.
" 12 b. *Triforis inflata* Watson var. *ibex* Dall ; 11.0. Page 249.

BLAKE MOLLUSCA. PLATE XX.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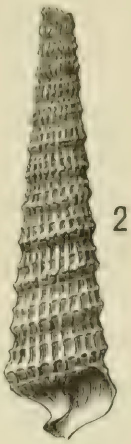
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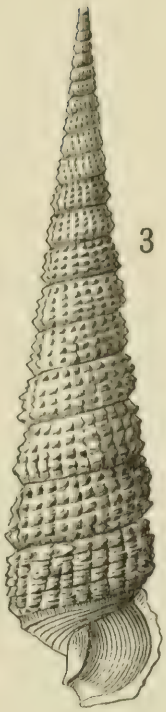
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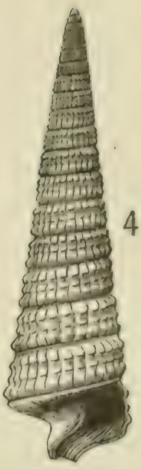
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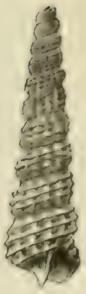
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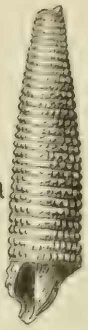
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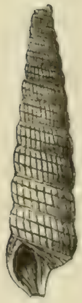
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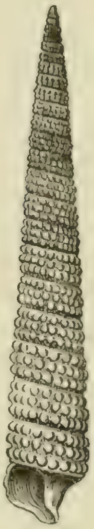
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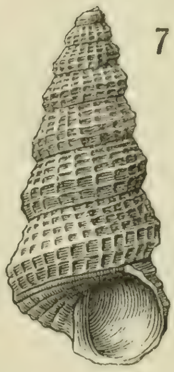
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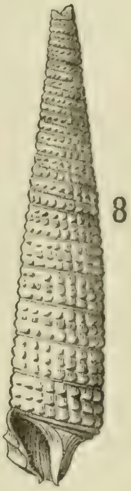
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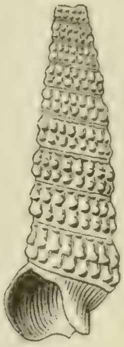
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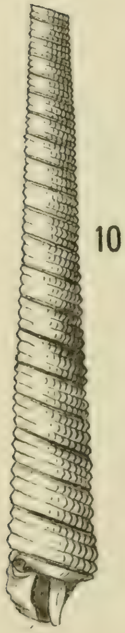
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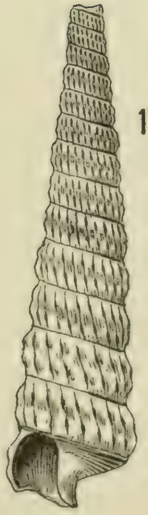
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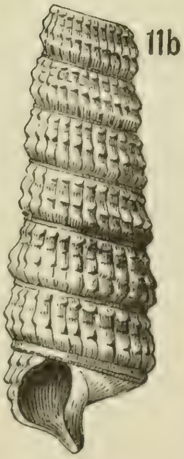
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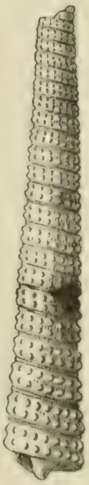
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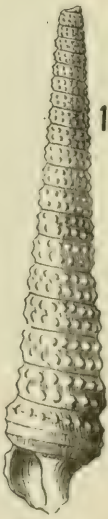
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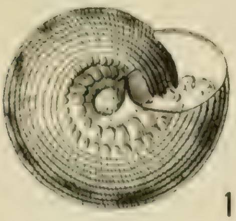
Photo. Lith. by L. S. Punderson & Son, New Haven, Conn.

PLATE XXI.

Fig. 1. *Solariella lacunella* Dall ; base, 5.0. Page 381.
" 1 a. *Solariella lacunella* Dall; profile, 4.5. Page 381.
" 2. *Calliostoma sapidum* Dall ; 5.0. Page 364.
" 2 a. *Calliostoma echinatum* Dall ; base, 4,75. Page 364.
" 3. *Dillwynella modesta* Dall ; top, alt. 3.0. Page 362.
" 3 a. *Dillwynella modesta* Dall ; profile, diam. 4.0. Page 362.
" 4. *Calliostoma sapidum* Dall ; base, 4.12. Page 364.
" 5. *Calliostoma echinatum* Dall ; 5.25. Page 364.
" 6. *Umbonium Bairdii* Dall, young specimen ; profile, alt. 4.0. Page 359.
" 6 a. *Umbonium Bairdii* Dall ; base, diam. 5.0. Page 359.
" 7. *Solariella iris* Dall ; profile, 5.0. Page 382.
" 7 a. *Solariella iris* Dall ; base, 5.5. Page 382.
" 8. *Solariella lissocona* Dall ; profile, 5.5. Page 381.
" 8 a. *Solariella lissocona* Dall ; base, 4.5. Page 381.
" 9. *Solariella lubrica* Dall ; profile, 4.0. Page 382.
" 9 a. *Solariella lubrica* Dall ; base, 3.25. Page 382.
" 10. *Solariella scabriuscula* Dall ; base, 4.0. Page 379.
" 10 a. *Solariella scabriuscula* Dall ; profile, 4.75. Page 379.
" 11. *Lunatia fringilla* var. *perla* Dall ; 6.5. Page 296.
" 12. *Lunatia fringilla* Dall ; 5.75. Page 295.

PLATE XXI.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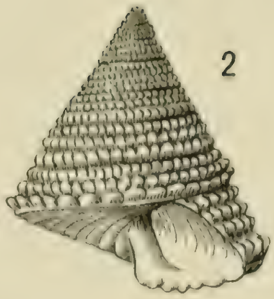
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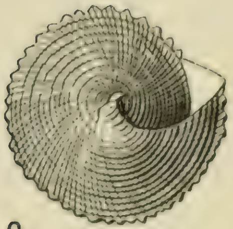
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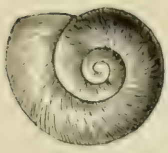
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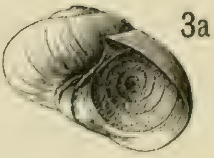
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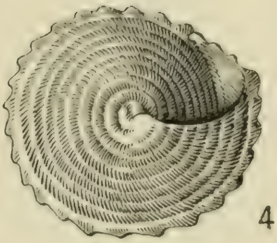
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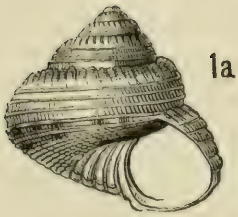
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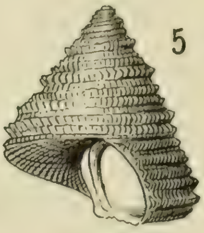
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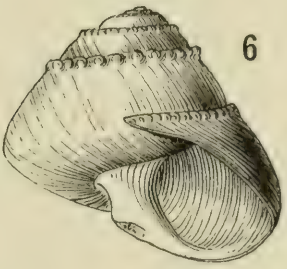
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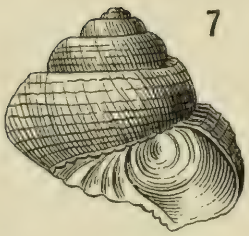
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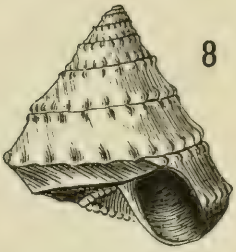
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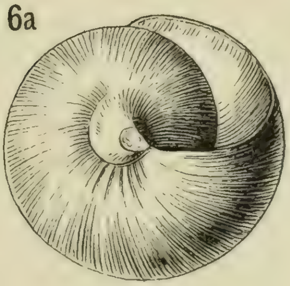
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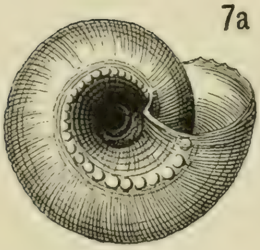
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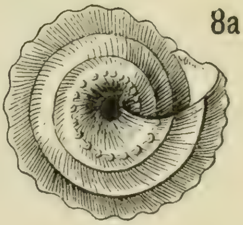
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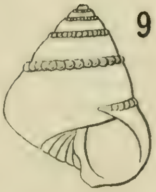
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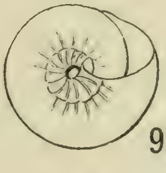
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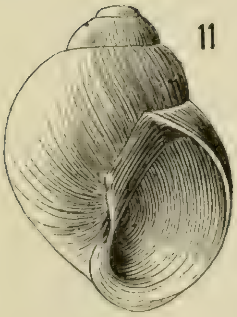
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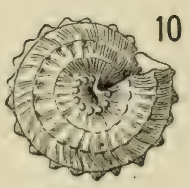
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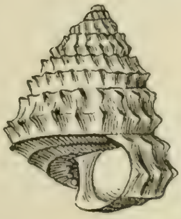
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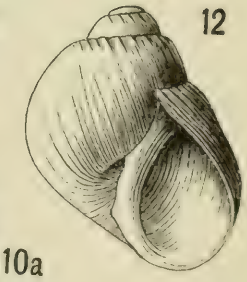
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PLATE XXII.

Fig. 1. *Turcicula imperialis* Dall, immature shell without the apical whorls; 13.0. Page 376.
" 1 a. *Turcicula imperialis* Dall; base, 13.0. Page 376.
" 2. *Basilissa alta* Watson, var. *delicatula* Dall; alt. 5.0. Page 384.
" 2 a. *Basilissa alta* Watson, var. *delicatula* Dall; base, diam. 6.0. Page 384.
" 3. *Calliostoma circumcinctum* Dall; diam. 6.9. Page 364.
" 3 a. *Calliostoma circumcinctum* Dall; alt. 8.0. Page 364.
" 4. *Gaza superba* Dall; profile, alt. 24.0. Page 354.
" 4 a. *Gaza superba* Dall; base, diam. 35.5. Page 354.
" 5. *Microgaza rotella* Dall; base, diam. 6.75. Page 357.
" 5 a. *Microgaza rotella* Dall; profile, alt. 4.0. Page 357.
" 6. *Fluxina brunnea* Dall; profile, alt. 10.75. The margins of the aperture are broken. Page 273.
" 6 a. *Fluxina brunnea* Dall; base, diam. 15.5. Page 273.
" 7. *Callogaza Watsoni* Dall; profile, alt. 7.75. Page 356.
" 7 a. *Callogaza Watsoni* Dall; base, diam. 12.5. Page 356.

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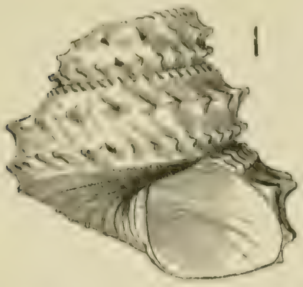

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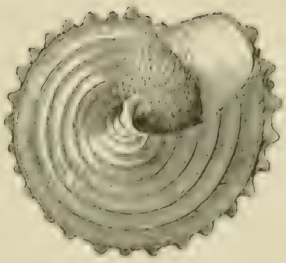

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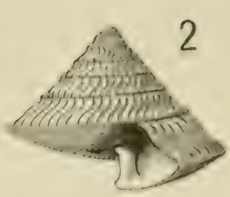

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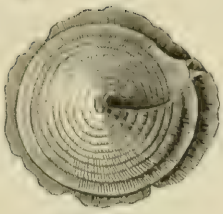

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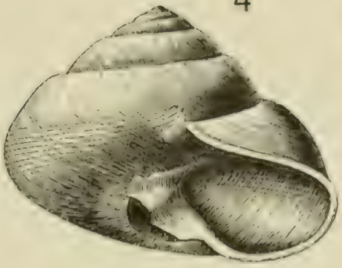

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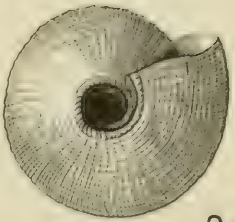

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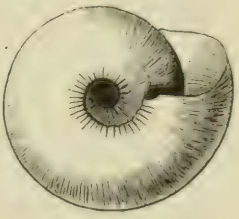

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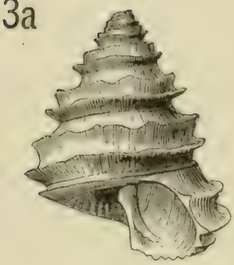

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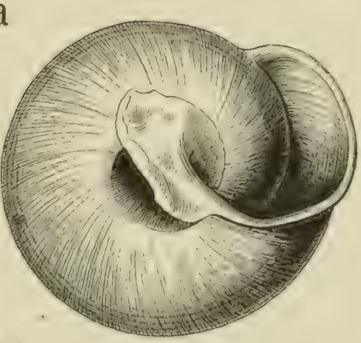

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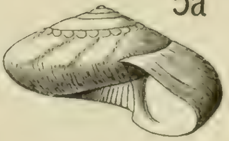

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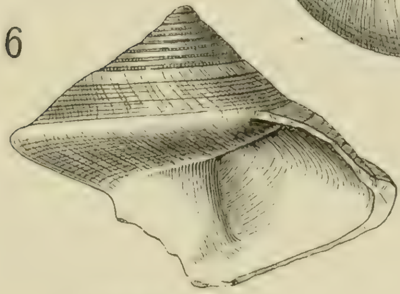

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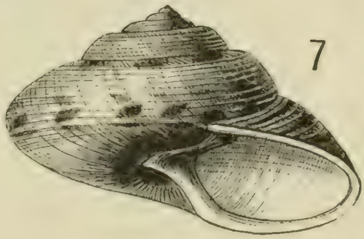

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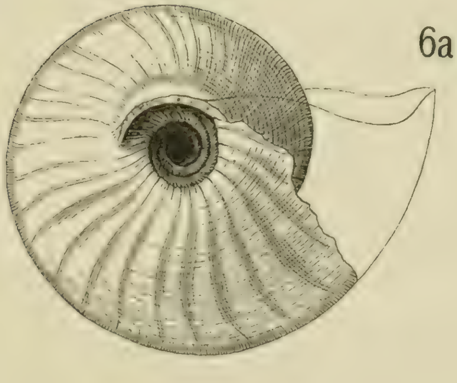

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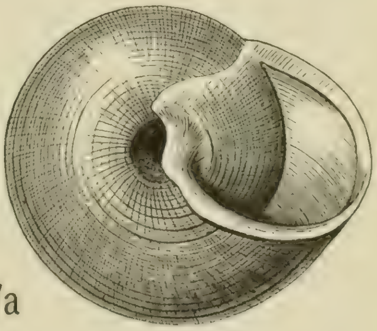

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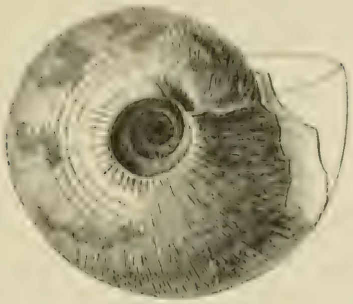
PLATE XXIII.

Fig. 1. *Callogaza Watsoni* Dall, young ; 8.0. Page 356.
" 1 a. *Callogaza Watsoni* Dall, young ; 8.0. Page 356.
" 2. *Liotia variabilis* Dall ; base, diam. 6.0. A calcareous foraminifer is attached to the periphery. Page 390.
" 2 a. The same in profile, alt. 4.5. Page 390.
" 3. *Solarium Sigsbeei* Dall ; diam. 5.5. Margin of aperture defective. Page 275.
" 3 a. The same in profile, alt. 2.3. Page 275.
" 4. *Basilissa* (*Ancistrobasis*) *costulata* Watson var. *depressa* Dall ; base, diam. 5.0. Page 384.
" 4 a. *Basilissa* (*Ancistrobasis*) *costulata* Watson var. *depressa* Dall ; profile, alt. 2.5. Page 384.
" 5. *Fluxina discula* Dall, profile ; alt. 3.0. Page 273.
" 6. *Fluxina discula* Dall ; base, 6.5. Page 273.
" 7. *Calliostoma* (*Dentistyla*) *asperrimum* var. *dentiferum* Dall ; base, 6.0. Page 373.
" 8. *Calliostoma* (*Dentistyla*) *asperrimum* var. *dentiferum* Dall ; profile, showing tooth on the pillar ; 7.5. Page 373.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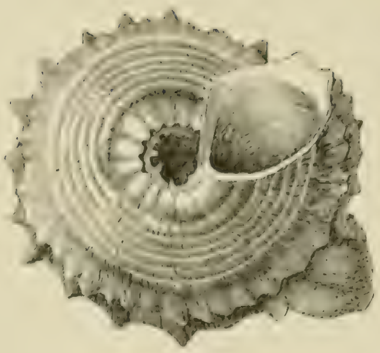
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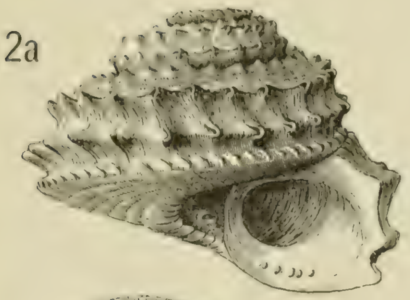
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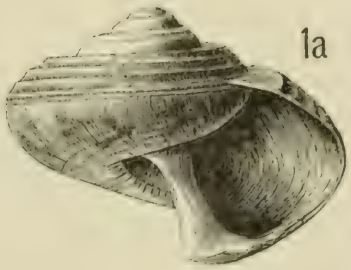
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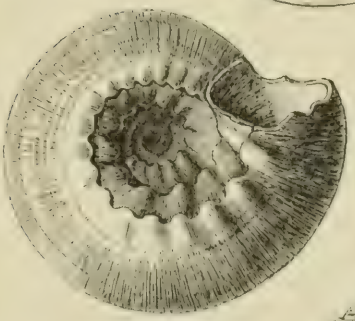
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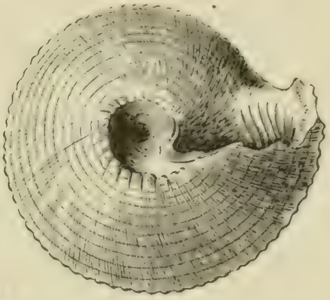
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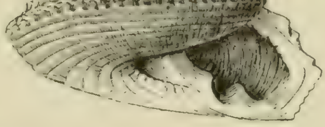
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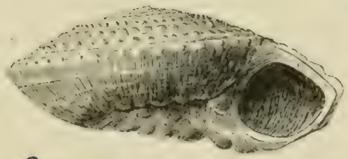
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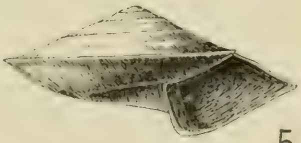
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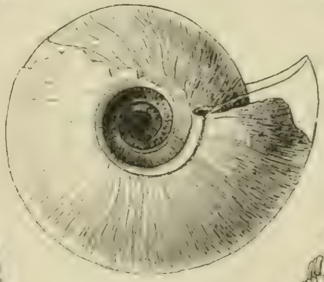
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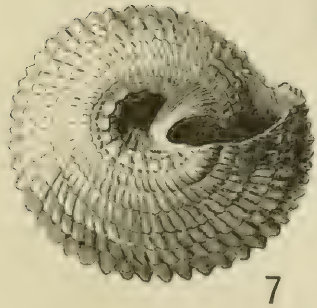
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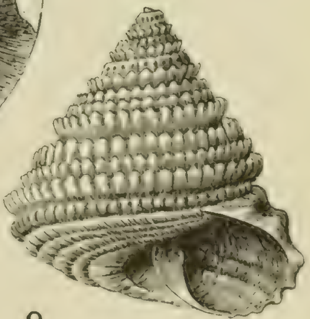
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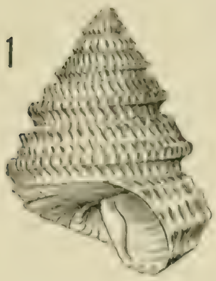
PLATE XXIV.

Fig. 1. *Calliostoma (Dentistyla) sericifilum* Dall ; 4.2. Page 373.
" 1 a. *Calliostoma (Dentistyla) sericifilum* Dall ; base, 4.5. Page 373.
" 2. *Callogaza Watsoni* Dall, base of young shell ; 6.0. Page 354.
" 2 a. *Callogaza Watsoni* Dall ; 6.0. Page 354.
" 3. *Calliostoma apicinum* Dall ; alt. 7.5. Page 366.
" 3 a. *Calliostoma apicinum* Dall ; base, diam. 7.0. Page 366.
" 4. *Calliostoma yucatecanum* Dall ; 7.0. Page 370.
" 4 a. *Calliostoma yucatecanum* Dall ; base, 7.0. Page 370.
" 5. *Liotia briareus* Dall ; alt. 7.5. Page 388.
" 5 a. *Liotia briareus* Dall ; base, 9.0. Page 388.
" 6. *Calliostoma roseolum* Dall ; alt. 9.5. Page 366.
" 6 a. *Calliostoma roseolum* Dall ; base, 7.0. Page 366.
" 7. *Leptothyra Philipiana* Dall ; alt. 3.5. Page 353.
" 7 a. *Leptothyra Philipiana* Dall ; base, diam. 4.0. Page 353. This species is named in honor of Dr. Philip P. Carpenter, another species having received the name of *Carpenteri* since this paper went to press.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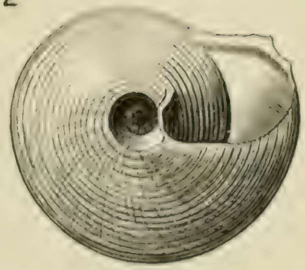
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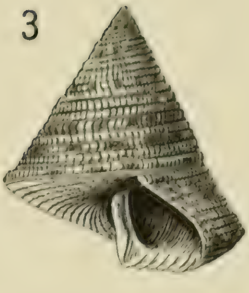
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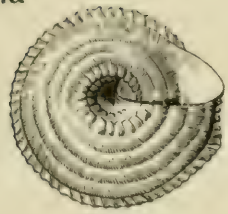
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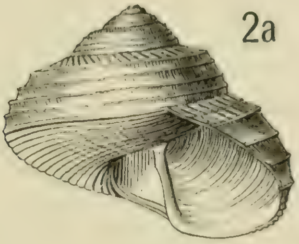
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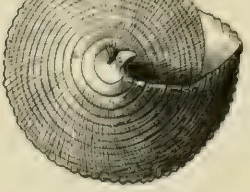
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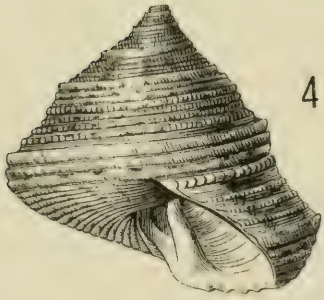
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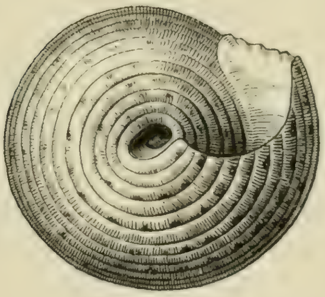
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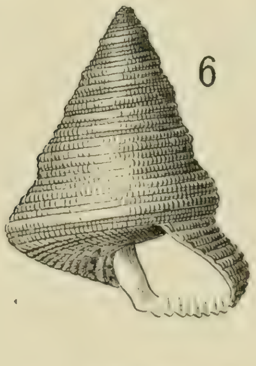
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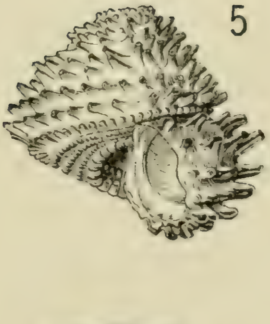
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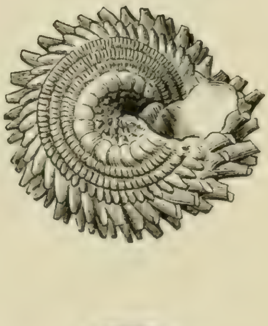
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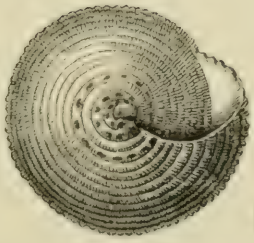
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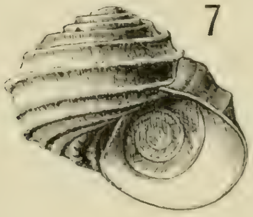
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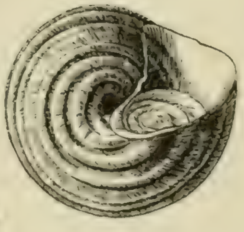
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PLATE XXV.

Fig. 1. *Addisonia* (*lateralis* var.?) *paradoxa* Dall, from above ; 10.0. Page 344.
" 1 b. *Addisonia* (*lateralis* var.?) *paradoxa* Dall, profile ; alt. 4.0. Page 344.
" 1 c. *Addisonia* (*lateralis* var.?) *paradoxa* Dall, from below, showing soft parts. Page 344.
" 1 d. *Addisonia* (*lateralis* var.?) *paradoxa* Dall ; showing animal crawling. Page 344.
" 1 e. *Addisonia* (*lateralis* var.?) *paradoxa* Dall ; dentition, complete series across the radula. Page 344.
" 2. *Cocculina Beanii* Dall ; dentition, transverse series and one detached uncinus. Page 347.
" 3. *Pectinodonta arcuata* Dall ; dentition, pair of laterals. Page 411.
" 3 a. *Pectinodonta arcuata* Dall ; base of right lateral, with cusp broken off. Page 411.
" 3 b. *Pectinodonta arcuata* Dall ; shell in profile, twice natural size. Page 411.
" 4. *Cocculina Beanii* Dall, in profile ; 8.0. Page 347.
" 5. *Cocculina Rathbuni* Dall ; dentition, transverse series and two detached uncini. Page 347.
" 6. *Lepetella tubicola* Verrill ; dentition, transverse series. Page 413.
" 7. *Cocculina Rathbuni* Dall, from above ; 10.0. Page 347.
" 7 a. *Cocculina Rathbuni* Dall, in profile ; 10.0. Page 347.
" 8. *Cocculina Beanii* Dall, from above ; 8.0. Page 347.

PLATE XXV.

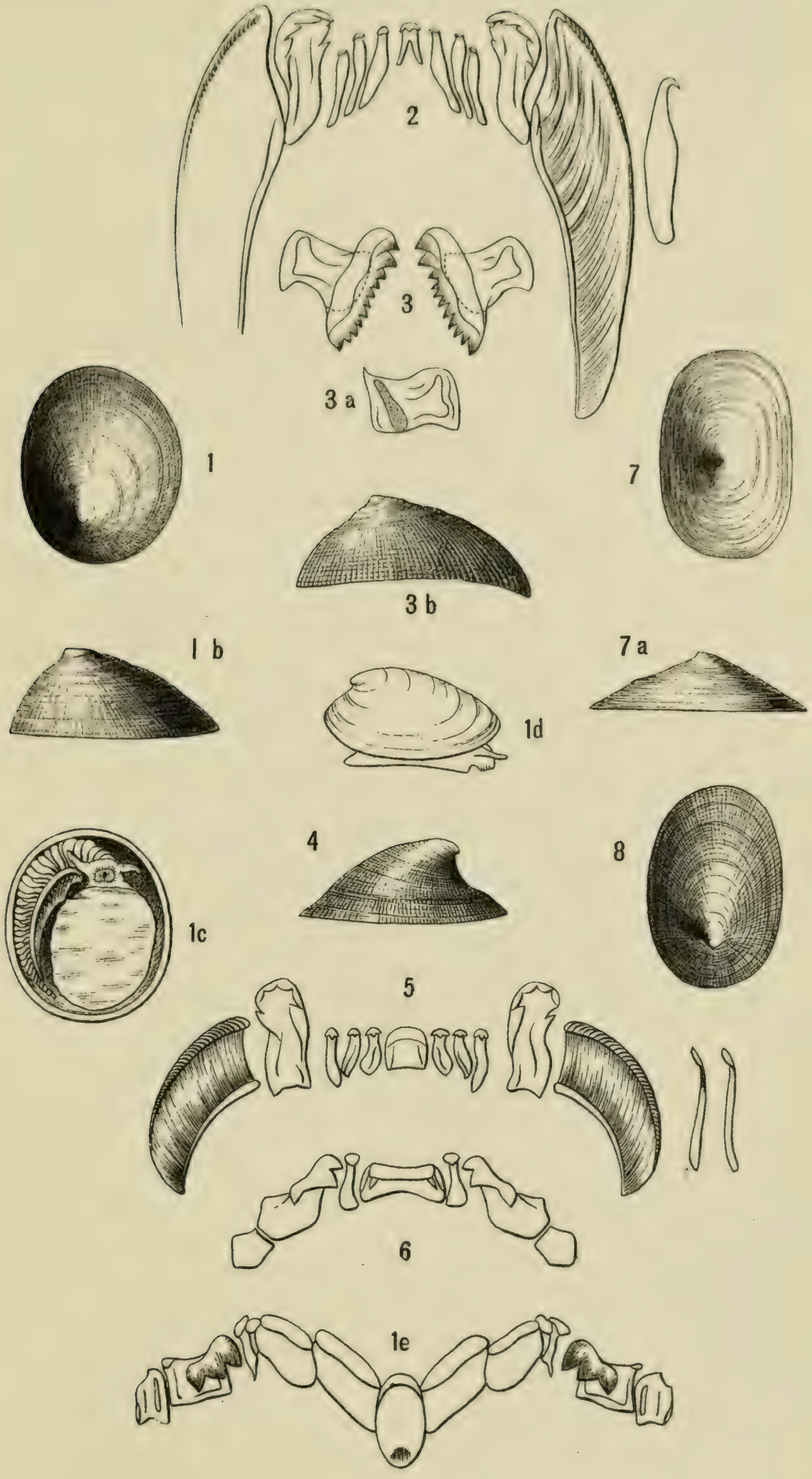
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PLATE XXVI.

Fig. 1. *Dentalium sericatum* Dall ; 13.0. Page 423.
" 2. *Turbonilla interrupta* Totten ; foot of animal from below, greatly magnified. Page 337.
" 2 b. *Turbonilla interrupta* Totten ; animal from above. Page 337.
" 3. *Turritella yucatecana* Dall ; 16.5. Page 265.
" 4. *Siliquaria modesta* Dall ; 26.0. Page 260.
" 5. *Dentalium ceratum* Dall ; 30.0. Page 424.
" 6. *Bivonia exserta* Dall, young in first stage ; 11.0. Page 264.
" 7. *Puncturella circularis* Dall ; from below ; 5.75. Page 403.
" 7 b. *Puncturella circularis* Dall, profile ; 5.75. Page 403.
" 7 c. *Turbonilla curta* Dall ; the aperture is imperfect ; 8.3. Page 337.
" 7 d. *Turbonilla belotheca* Dall ; 14.0. Page 335.
" 8. *Puncturella trifolium* Dall, from below ; 14.0. Page 403.
" 8 b. *Puncturella trifolium* Dall, profile ; 14.0. Page 403.
" 8 c. *Hanleyia tropicalis* Dall ; medial valve ; 4.0. Page 415.
" 8 d. *Hanleyia tropicalis* Dall ; posterior valve ; 3.0. Page 415.
" 9. *Dentalium ophiodon* Dall ; 12.5. Page 427.
" 10. *Mathilda barbadense* Dall ; 6.2. Page 266.

BLAKE MOLLUSCA.

PLATE XXVI.

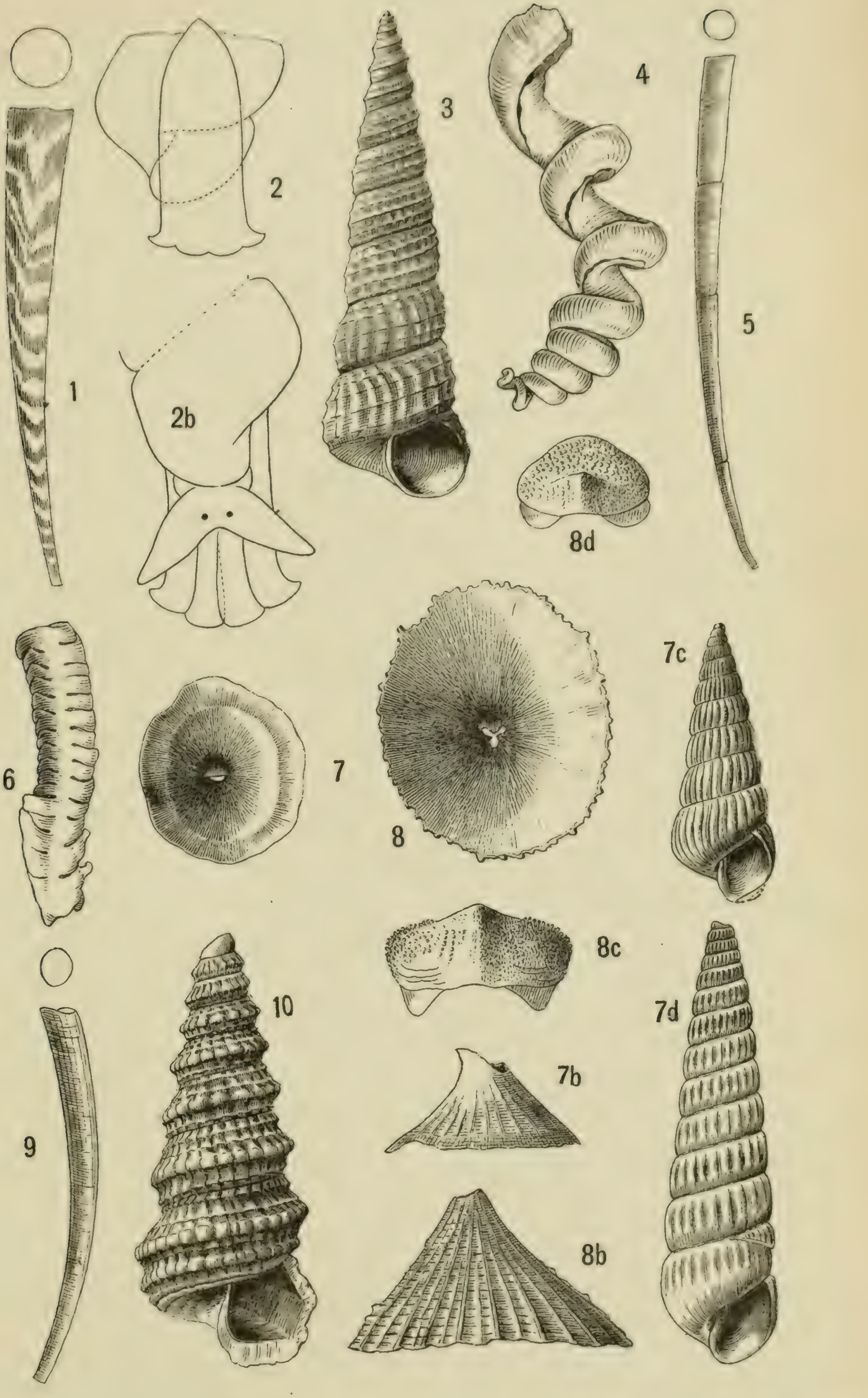
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PLATE XXVII.

Fig. 1. *Dentalium laqueatum* Verrill ; 29.0. Page 426.

" 2. *Dentalium ceratum* Dall, very young ; 7.0. Page 424.

" 3. *Dentalium carduus* Dall ; 16.0. Page 423.

" 4. *Dentalium Gouldii* Dall, var. *obscurum ;* 28.0. Page 424.

" 5. *Cadulus quadridentatus* Dall, and outline of aperture, of which the antero-posterior line is across the plate ; 10.0. Page 428.

" 6. *Dentalium perlongum* Dall, and outline of aperture, of which the antero-posterior line is across the plate ; 80.0. Page 419.

" 7. *Cadulus amiantus* Dall; 5.75. Page 431.

" 8. *Cadulus lunula* Dall, and outline of aperture, of which the antero-posterior line is across the plate ; 6.0. Page 431.

" 9. *Cadulus æqualis* Dall, and outline of aperture, of which the antero-posterior line is across the plate ; 15.0. Page 429.

" 10. *Dentalium callithrix* Dall ; 25.0. Page 427.

" 11. *Cadulus acus* Dall ; 8.0. Page 432.

" 12. *Dentalium ensiculus* Jeffreys, and outline of aperture, of which the antero-posterior line is across the plate ; 20.0. Page 428.

" 12 a. *Cadulus Watsoni* Dall, and outline of aperture, of which the antero-posterior line is across the plate ; 13.0. Page 429.

" 12 b. *Dentalium callipeplum* Dall ; 36.0. Page 419.

" 12 c. *Cadulus Agassizii* Dall, and outline of aperture, of which the antero-posterior line is across the plate ; 9.0. Page 430.

" 12 d. *Cadulus cucurbita* Dall, and outline of aperture, of which the antero-posterior line is across the plate; 4.0. Page 431.

PLATE XXVII.

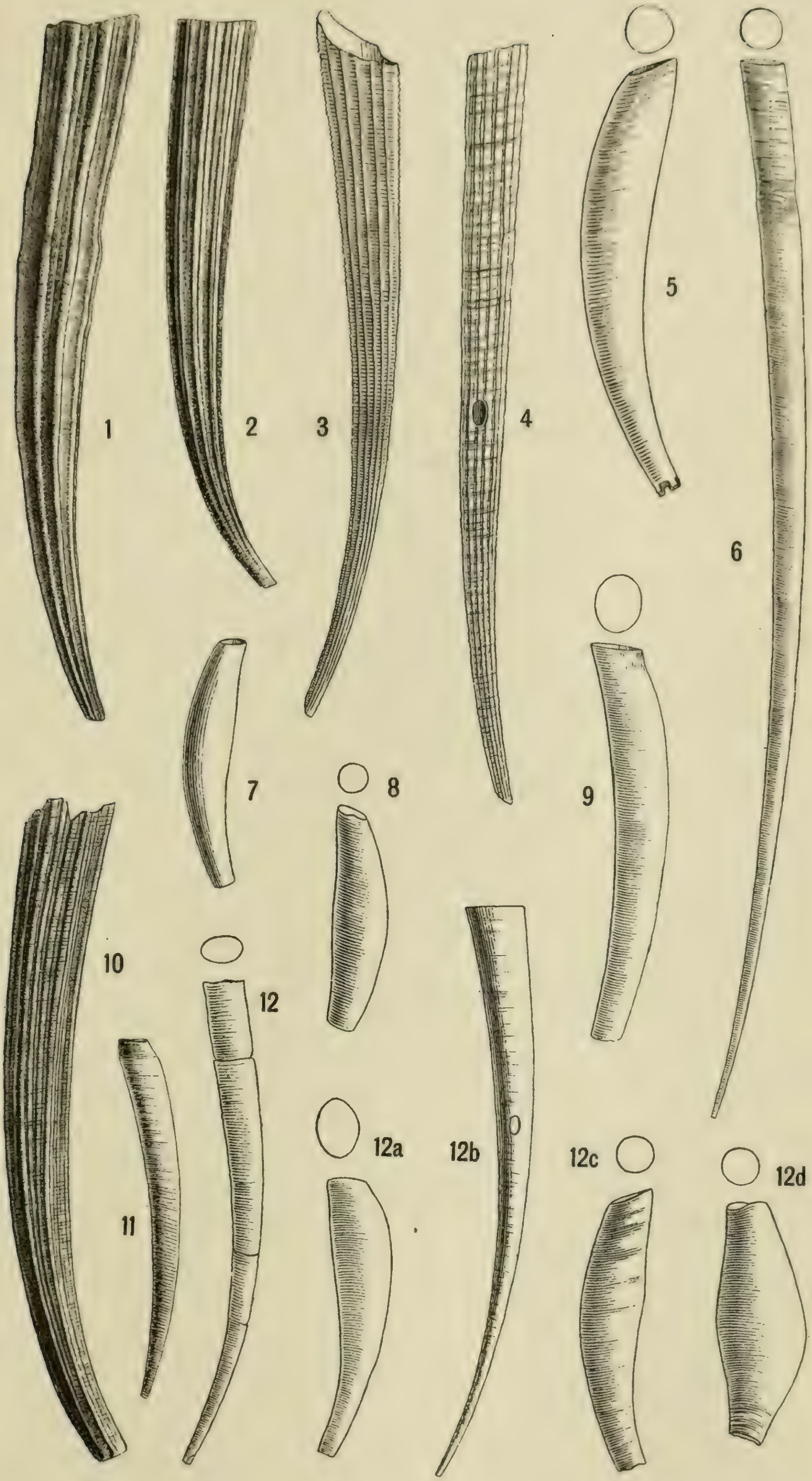
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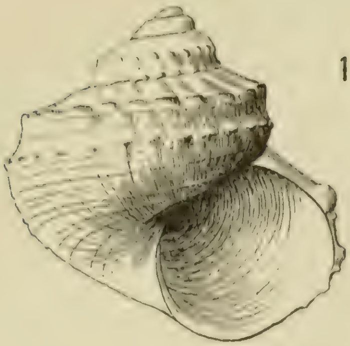
PLATE XXVIII.

Fig. 1. *Margarita erythrocoma* Dall ; alt. 5.0. Page 375.
" 2. *Calliostoma orion* Dall ; alt. 4.5. Page 367.
" 3. *Ethalia solida* Dall, base ; 2.75. Page 362.
" 4. *Rimula frenulata* Dall, from above ; 6.25. Page 406.
" 5. *Ethalia solida* Dall, profile ; 2.0. Page 362.
" 6. *Fossarus* (*Gottoina*) *compactus* Dall, profile ; 2.3. Page 273.
" 7. *Ethalia reclusa* Dall, profile ; alt. 1.0. Page 361.
" 8. *Ethalia reclusa* Dall, base ; 2.1. Page 361.
" 9. *Cyclostrema pompholyx* Dall ; 4.2. Page 394.
" 10. *Fossarus* (*Gottoina*) *bellus* Dall ; 3.5. Page 272.
" 11. *Liotia miniata* Dall ; 2.5. Page 390.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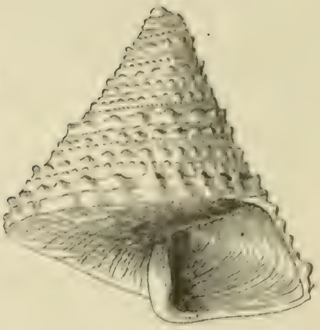
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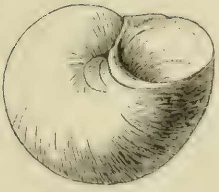
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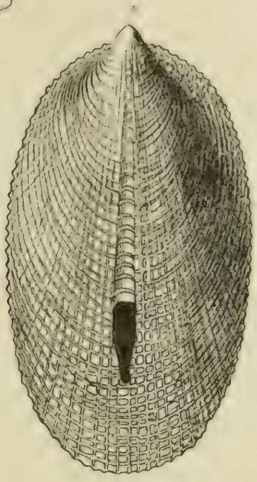
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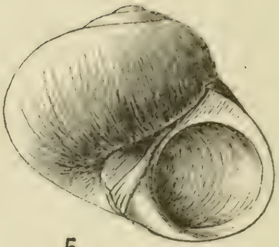
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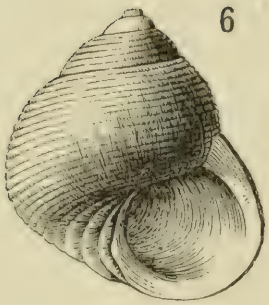
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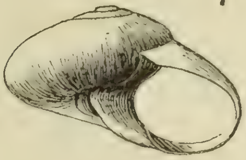
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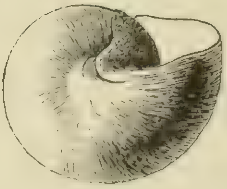
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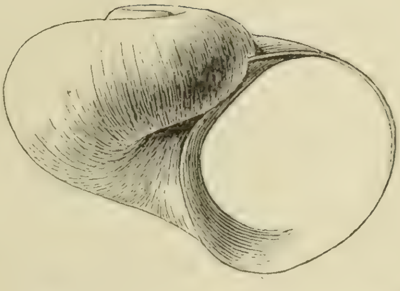
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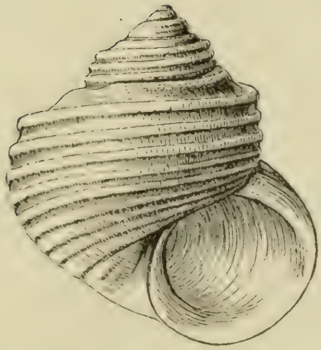
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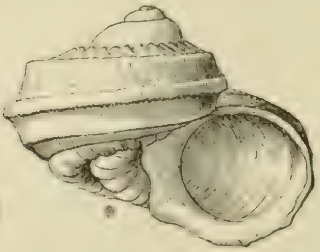
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PLATE XXIX.

Fig. 1. *Pleurotomaria Quoyana* F. & B. The animal sketched from life by J. H. Blake, redrawn by McConnell; 50.0. Page 397.

" 2. *Lampusia gracile* Reeve; 25.5. Page 227.

" 3. *Aurinia Gouldiana* Dall; 69.0. Page 154.

" 4. *Fusus Caloosaënsis* Heilprin; 60.0. Page 167. In arranging the figures for the plates, by an error this figure was substituted for that of *F. timessus,* Dall. The figure of *F. timessus* will therefore appear in my Report on the Fossils of the Florida Pliocene.

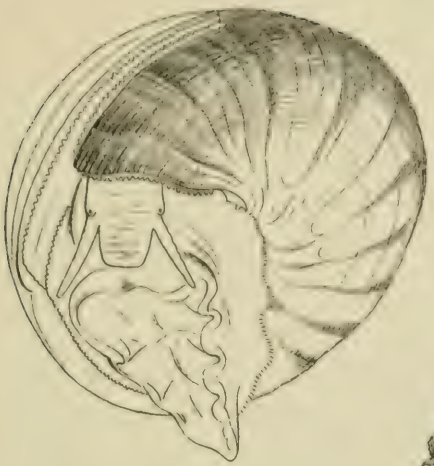
" 5. *Æsopus Stearnsii* Tryon; 4.0. Page 194.

" 6. *Terebra* (*Acus*) *benthalis* Dall; 21.0. Page 65.

" 7. *Dolophanes Gabbii* Dall; 9.00. Page 270.

" 8. *Mesostoma migrans* Dall; 9.25. Page 270.

Figures 3 and 5 were drawn by Sherman F. Denton; Figure 4, by John L. Ridgway; the others, by Dr. J. C. McConnell.



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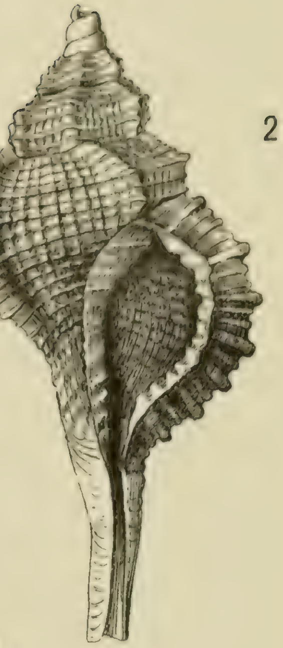

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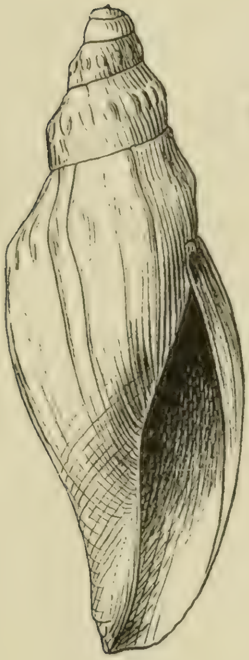

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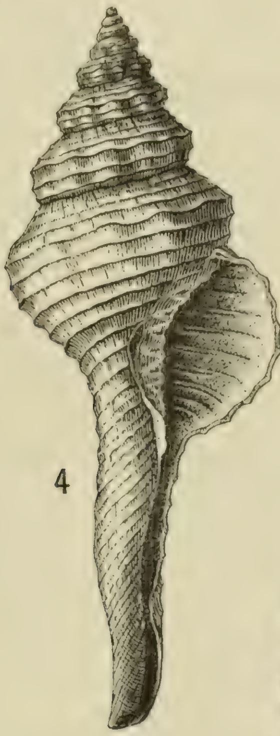

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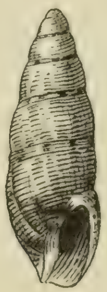

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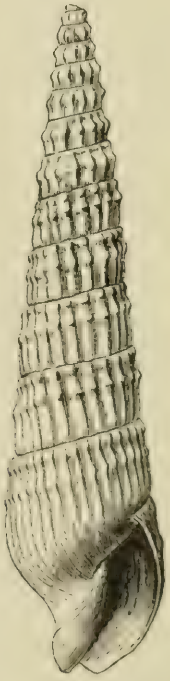

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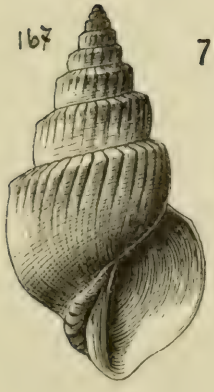

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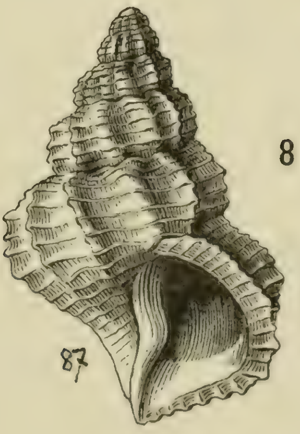

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PLATE XXX.

Fig. 1. *Pleurotomaria Adansoniana* C. & F. Redrawn by McConnell from water-color sketch from life by J. H. Blake. The shell is merely indicated. Page 400.

" 2. Anterior termination of gill in *P. Adansoniana.* *a*, osphradium; *b*, blood sinus (?). Only the inner series of gill lamellæ is here indicated. At this part of the gill they are narrow and pointed; farther back, they become broader and more rounded at the distal end.

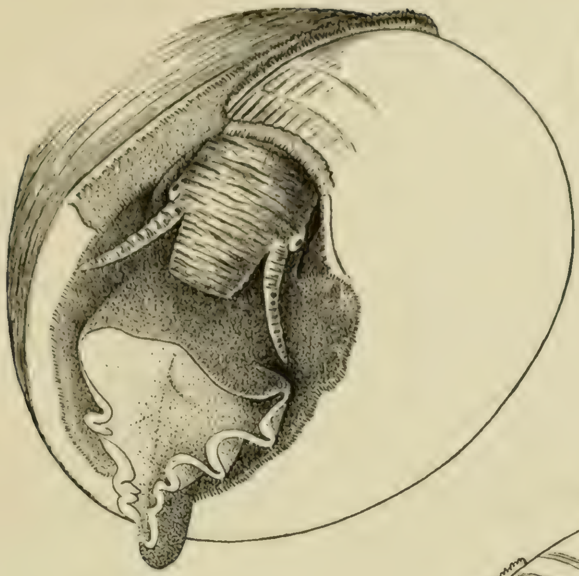
" 3. Posterior free termination of intestine (*c*) lying on the glandular (renal ?) organ, behind which in the commissure are two orifices on each side (*a*), with a short bunch of papillæ behind them and the flaps of the mantle with their papillose edges (*b*) corresponding to the edges of the sinus on each side. Page 400.

" 4. Another specimen. Page 400.

" 5. The first specimen crawling. Page 400.

" 6. The head, viewed from above. Page 400.

1



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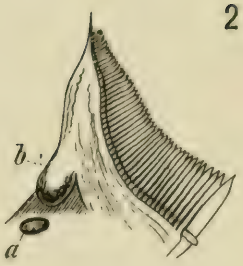

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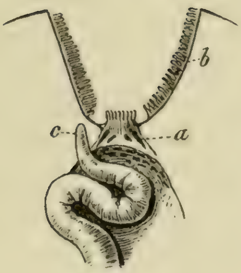

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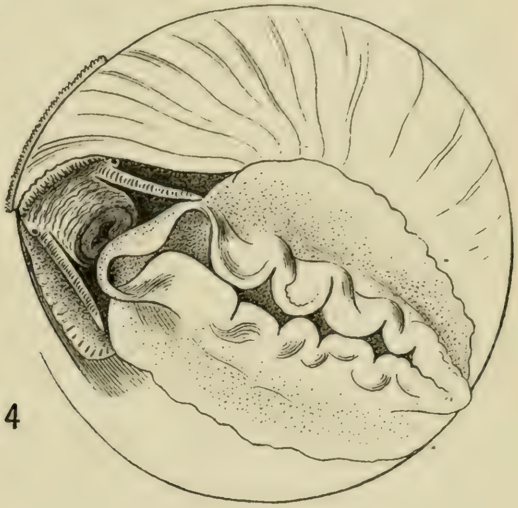

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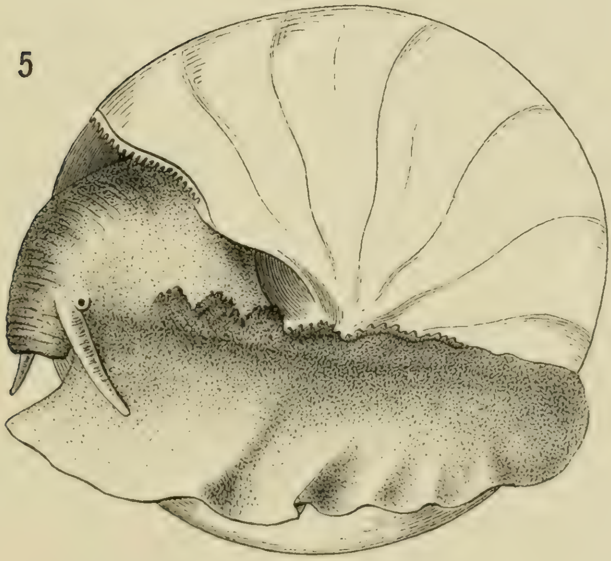

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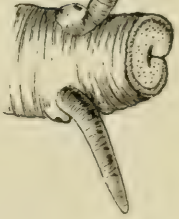

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PLATE XXXI.

Fig. 1. *Pleurotomaria Quoyana* F. & B. Rhachidian and lateral teeth much magnified. 1 b, one of the outermost uncini ; 1 c, one of the inner tricuspid uncini greatly magnified. Page 397.

" 2. *Propilidium ancyloide* Forbes. Transverse row of teeth from above. 2 b, rhachidian and lateral teeth in profile ; 2 c, jaw. All much magnified. Page 412.

" 3. *Pleurotomaria Adansoniana* C. & F. Separated teeth numbered in their order from the rhachis ; *o*, rhachidian tooth. Page 400.

" 4. General view of a single transverse row of teeth. Page 400.

" 5. Same, a single tufted uncinus ; $\frac{112}{1}$. Page 400.

" 6. Same, end of tufted uncinus ; $\frac{250}{1}$. Page 400.

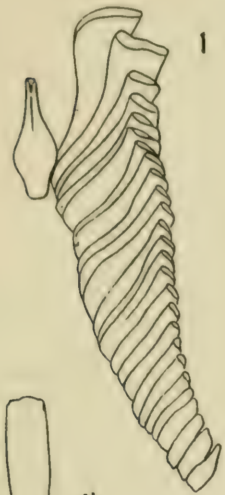
" 7. *Cocculina spinigera* Jeffreys. Penis from above magnified. Pages 346, 348.

" 8. *Cocculina spinigera* Jeffreys. Head from above, showing tentacles and position of penis at the side of the right tentacle, magnified. Page 346.

" 9. Rhachidian tooth of *C. spinigera*. Page 346.

" 10. *Scutellina antillarum* (Shuttleworth) Auct. Showing rhachidian tooth, laterals and consolidated uncini of one side of a single transverse row of the radula ; $\frac{180}{1}$. Page 342.

" 11. The same, a single separated uncinus. Page 342.



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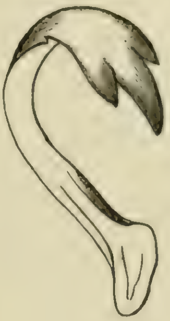

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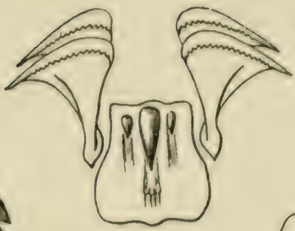

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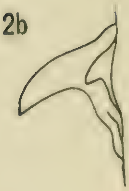

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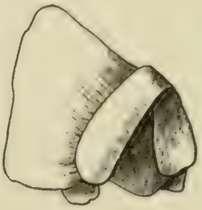

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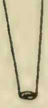

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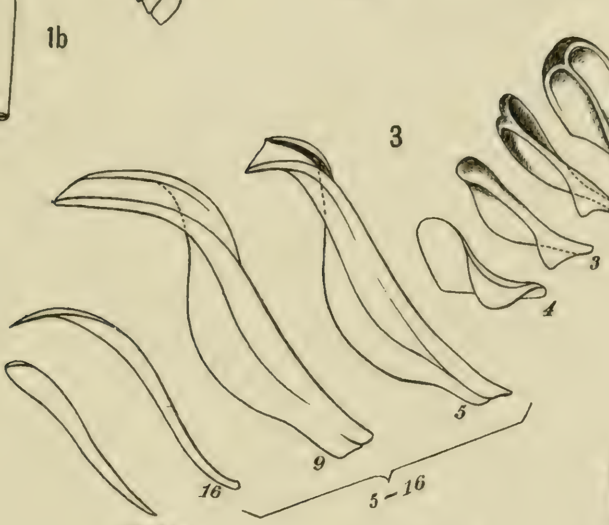

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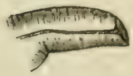

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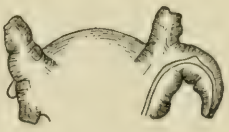

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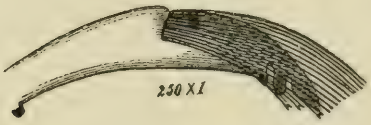

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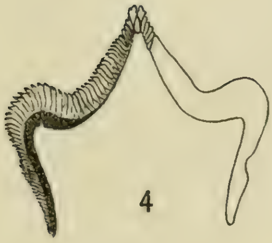

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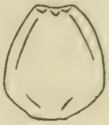

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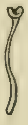

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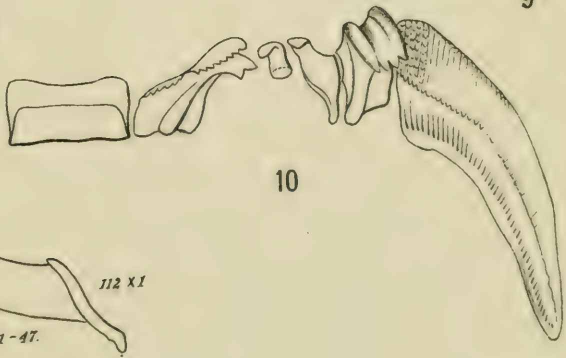

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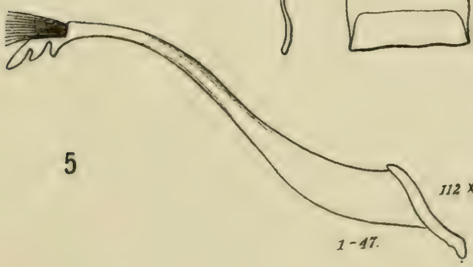

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PLATE XXXII.

Fig. 1. *Calliostoma* (*Eutrochus*) *cinctellum* Dall ; 8.0. Page 372.
" 2. *Pleurotoma periscelida* Dall ; 40.5. Page 74.
" 3. *Calliostoma* (*Eucasta*) *indiana* Dall ; 7.6. Page 368.
" 4. *Calliostoma* (*Eutrochus*) *cinctellum* Dall ; 9.5. Page 372.
" 5. *Calliostoma* (*Eucasta*) *indiana* Dall ; 8.5. Page 368.
" 6. *Liotia* (*Lippistes*) *acrilla* Dall ; 4.3. Page 391.
" 7. *Calliostoma* (*Eutrochus*) *Benedicti* Dall ; 18.0. Page 371.
" 8. *Margarita* (*Bathymophila*) *euspira* Dall ; alt. 5.75 ; max. diam. 7.0. Page 378.
" 9. *Liotia* (*Lippistes*) *amabilis* Dall ; 5.0. Page 392.
" 10. *Pleurotomaria Adansoniana* C. & F. ; 35.0. Page 400.
" 11. *Liotia* (*Lippistes*) *acrilla* Dall ; 4.3. Page 391.
" 12. *Liotia* (*Lippistes*) *amabilis* Dall ; 5.0. Page 392.
" 12 a. *Nassarina Grayi* Dall ; 12.0. Page 183.

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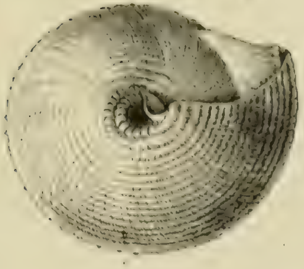

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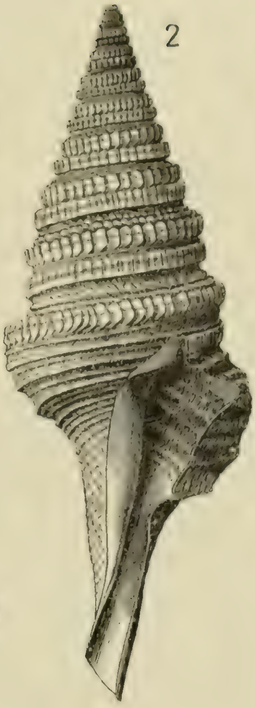

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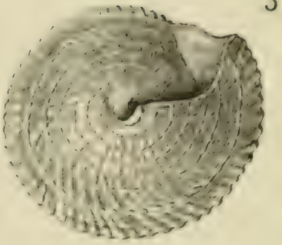

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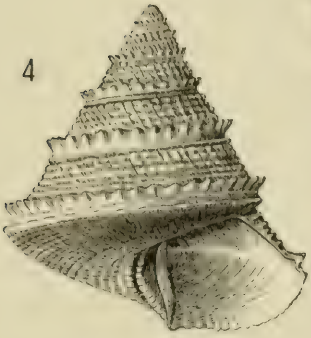

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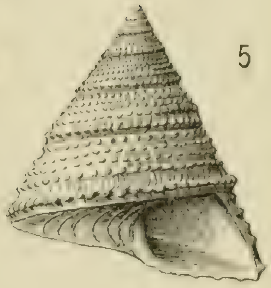

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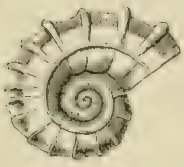

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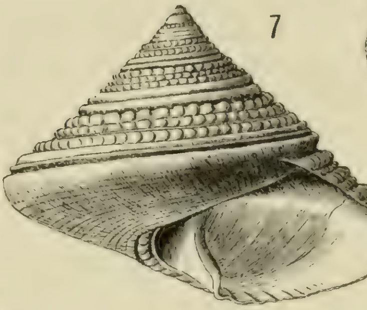

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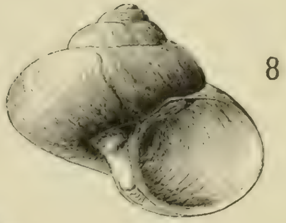

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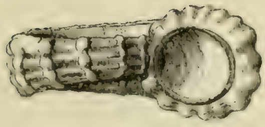

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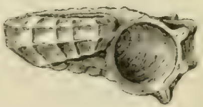

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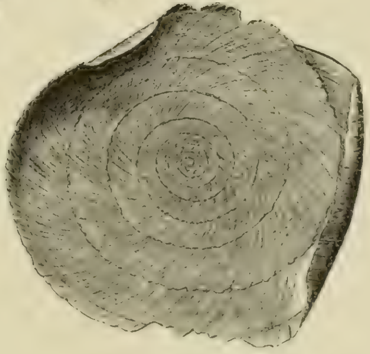

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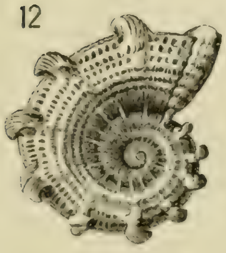

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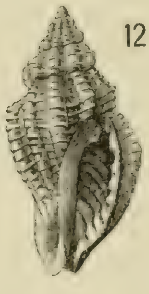

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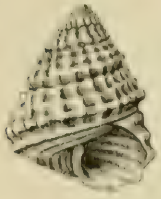
PLATE XXXIII.

Fig. 1. *Calliostoma corbis* Dall ; 5.0. Page 365.
" 2. *Solarium peracutum* Dall ; 17.5. Page 275.
" 3. *Ovulactæon Meekii* Dall ; apex, 3.0. Page 43.
" 4. *Ovulactæon Meekii* Dall ; 5.5. Page 43.
" 5. *Solarium peracutum* Dall ; 17.5. Page 275.
" 6. *Cyclostrema turbinum* Dall ; 3.25. Page 393.
" 7. *Euchelus guttarosæ* Dall ; 5.00. Page 382.
" 8. *Liotia Bairdii* Dall ; 6.0. Page 389.
" 9. *Leptothyra Linnei* Dall ; 5.5. Page 353.
" 10. *Calliostoma* (*Eutrochus*) *Sayanum* Dall ; 40.0. Page 370.
" 11. *Calliostoma* (*Eutrochus*) *Sayanum* Dall ; 37.0. Page 370.



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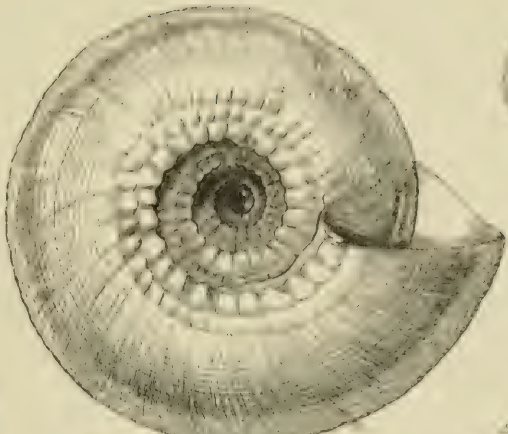

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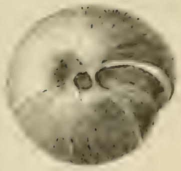

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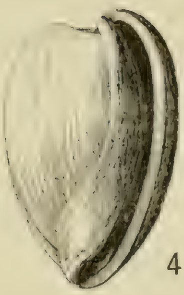

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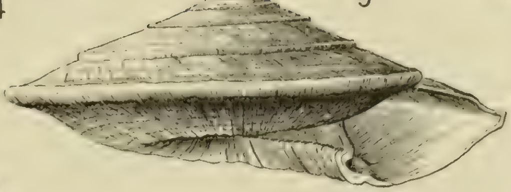

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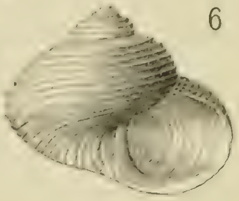

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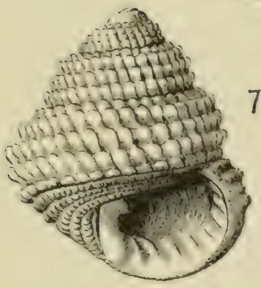

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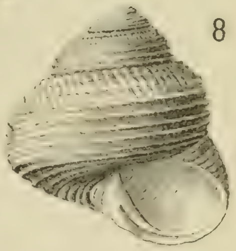

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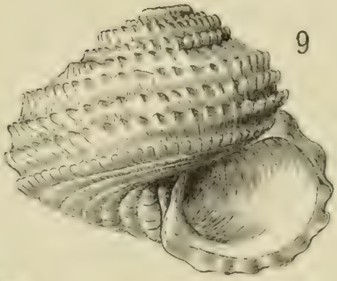

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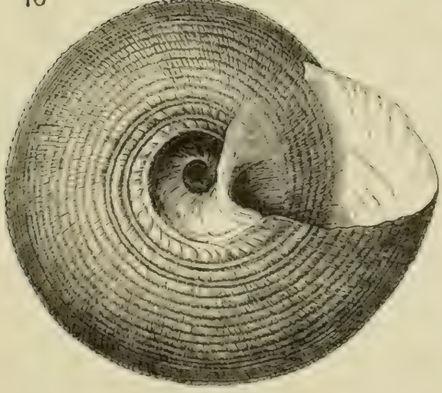

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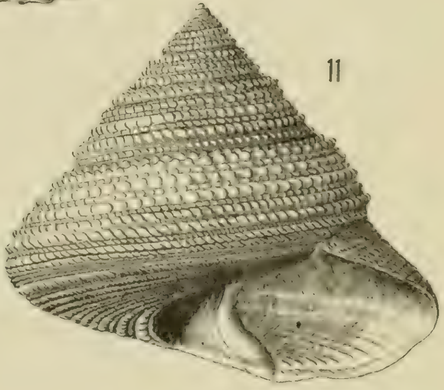

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PLATE XXXIV.

These figures are from unpublished drawings by the late Dr. William Stimpson.

Fig. 1. *Olivella mutica* Say ; *a–g*, varieties of form and color, natural size ; *h*, operculum, natural size ; *i*, *l*, operculum outside and inside, magnified ; *m*, animal crawling ; *n*, head, showing absence of eyes and tentacles ; *o*, section of oral aperture, magnified ; *p*, penis ; *r*, section of shell showing absorption of internal walls. Page 133.

" 2. *Olivella mutica* Say ; dentition. Page 133.

" 3. *Purpura floridana* Conrad. *c*, animal from below, natural size ; *d*, head and verge from above. Page 217.

" 4. *Purpura floridana* Conrad ; dentition. Page 217.

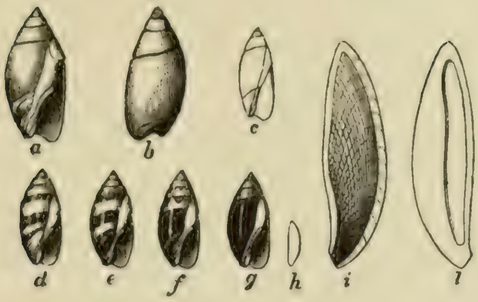
" 5. *Scaphella junonia* Hvass. *b*, shell one half natural size ; *c*, sculpture of early whorls ; *d*, nucleus ; *e*, section of shell. Page 148.

" 6. *Volutomitra grönlandica* Beck. Young shell and magnified nucleus. Page 145.

" 7. *Volutomitra grönlandica* Beck. Rhachidian tooth ; *a*, from above ; *b*, in profile. Page 145.

" 8. *Oliva literata* Lamarck. *a*, animal crawling, $\frac{2}{3}$; *b*, tentacula and eyes ; *c*, soft parts removed from the shell, showing (*f*) foot, (*g*) propodium, (*h*) respiratory siphon, (*i*) vent, (*l*) posterior filament of mantle, (*m*) mantle raised up, (*n*) verge, (*o*) gill ; *d*, section of muzzle showing proboscis extruded ; *e*, gill and sensory organ (osphradium). Page 133.

" 8′. *Oliva literata* Lamarck. Dentition taken from a female specimen. Page 133.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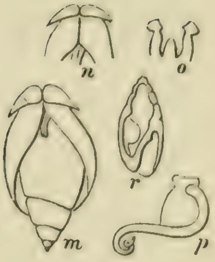

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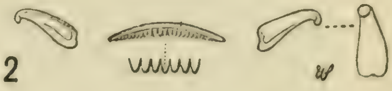

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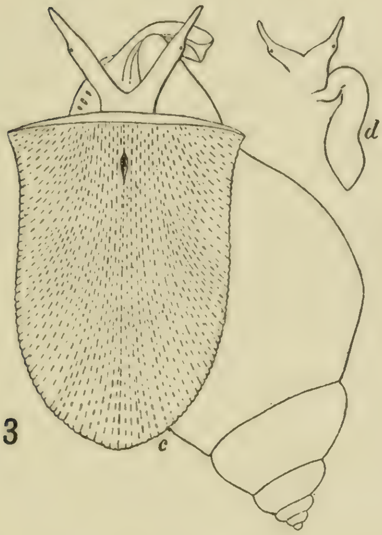

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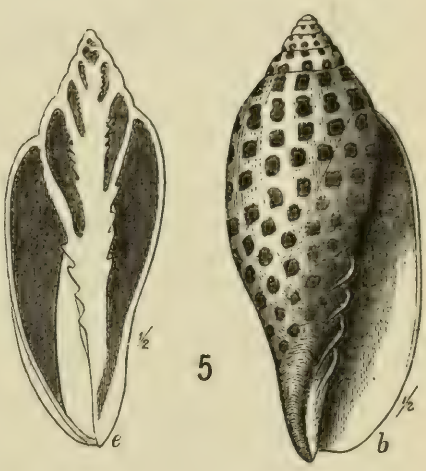

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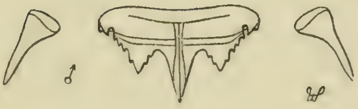

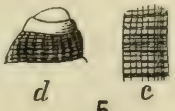

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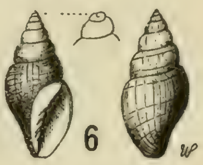

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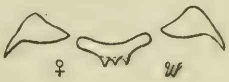

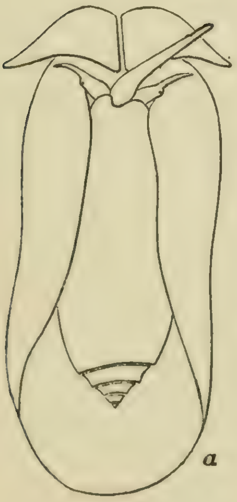

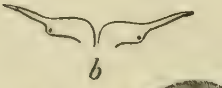

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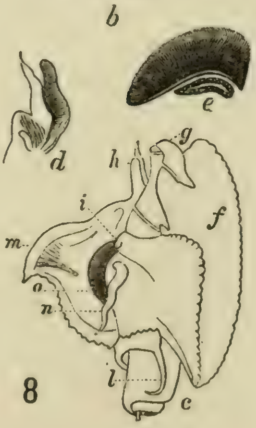
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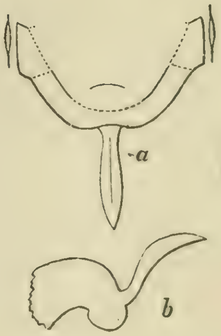

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PLATE XXXV.

Fig. 1. *Mitromorpha biplicata* Dall ; 7.0. Page 165.
" 2. *Aurinia robusta* Dall ; 119.0. Page 153.
" 3. *Columbella* (*Astyris*) *profundi* Dall ; 8.0. Page 192.
" 4. *Cancellaria* (*Trigonostoma*) *Agassizi* Dall ; 13.5. Page 130.
" 5. *Fusus eucosmius* Dall ; 85.0. Page 167.
" 6. *Benthobia Tryoni* Dall ; 13.0. Page 132.
" 7. *Fusus halistreptus* Dall ; 80.0. Page 168.
" 8. *Marginella cassis* Dall ; 15.0. Page 137.
" 9. *Columbella* (*Astyris*) *diaphana* Verrill ; 9.0. Page 191.
" 10. *Conomitra Blakeana* var. *lævior* Dall ; 9.75. Page 164.
" 11. *Liomesus ? Stimpsoni* Dall ; 32.5. Page 176.
" 12. *Eudolium Verrillii* Dall ; 32.0. Page 233.
" 12 a. *Sipho* (*Ptychosalpinx ?*) *globulus* Dall ; 31.0. Page 175.

BLAKE MOLLUSCA.

PLATE XXXV.

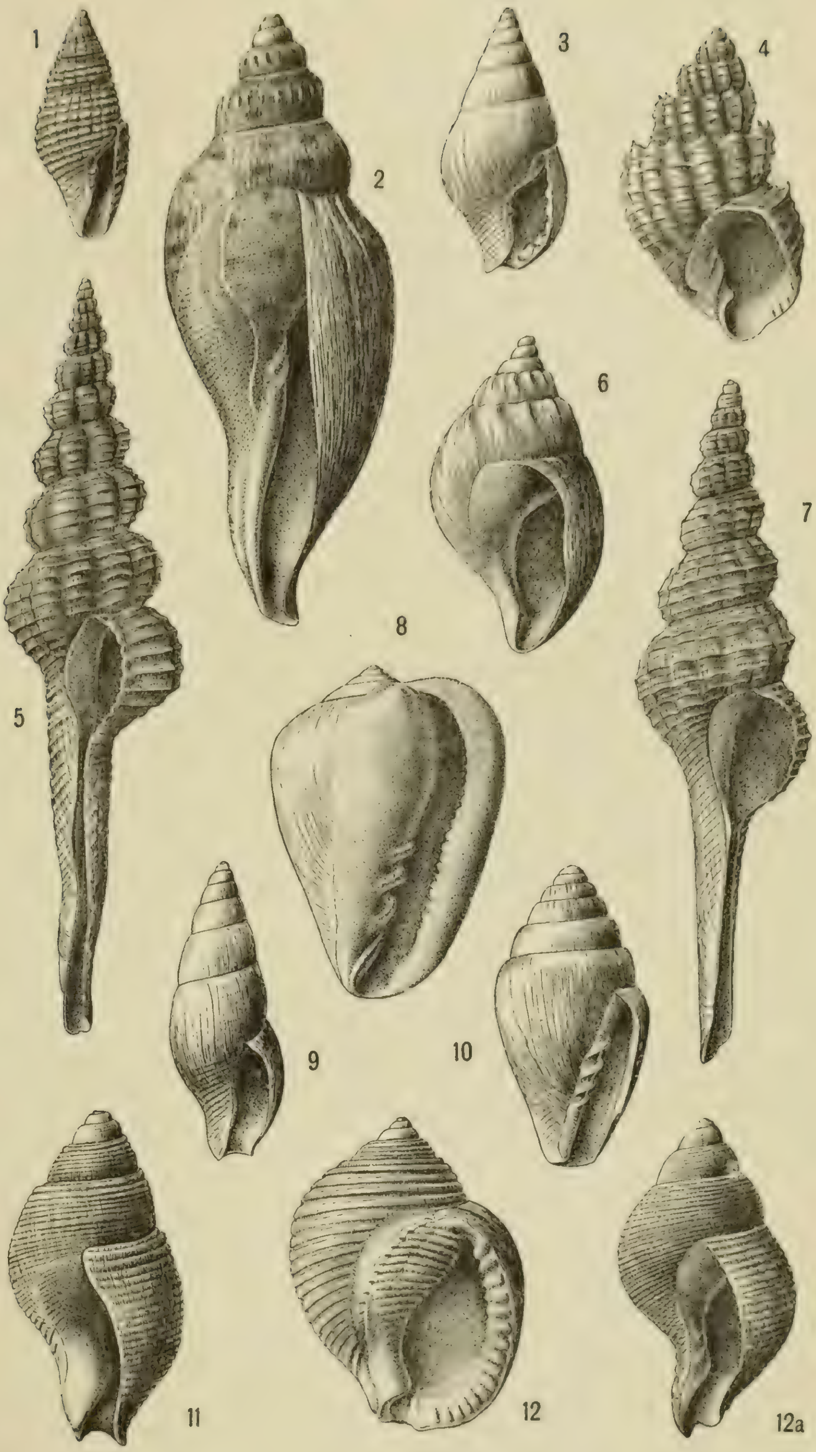
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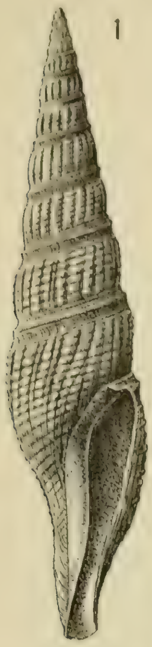
PLATE XXXVI.

Fig. 1. *Drillia alcsidota* var. *macilenta* Dall ; 36.5. Page 85.
“ 2. *Lampusia pharcida* Dall ; 23.6. Page 227.
“ 3. *Drillia (Cymatosyrinx) Moseri* Dall ; 30.0. Page 97.
“ 4. *Daphnella pompholyx* Dall ; 12.5. Page 104.
“ 5. *Leucosyrinx tenoceras* Dall ; 60.0. Page 76.
“ 6. *Pleurotomella Edgariana* Dall ; 58.0. Page 121.
“ 7. *Mesorhytis Meekiana* Dall ; 15.5. Page 172.
“ 8. *Terebra nassula* Dall ; 55.0. Page 66.
“ 9. *Drillia (Cymatosyrinx) centimata* Dall ; 22.5. Page 95.
“ 10. *Drillia (Cymatosyrinx) œpynota* Dall ; 15.0. Page 96.
“ 11. *Cordieria Rouaultii* Dall ; 13.6. Page 98.

PLATE XXXVI.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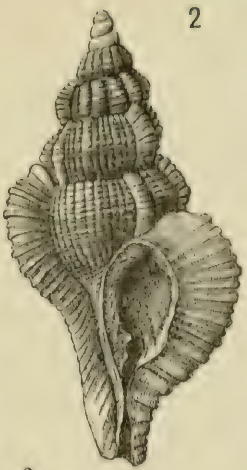
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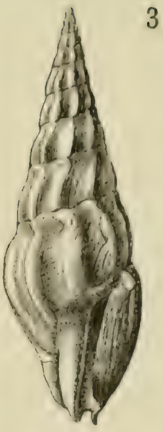
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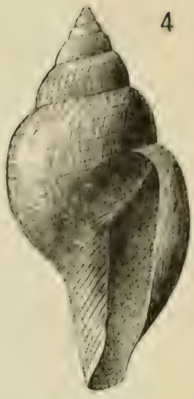
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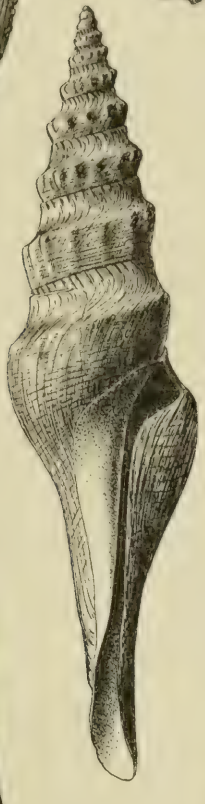
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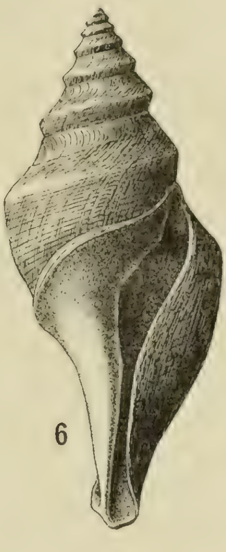
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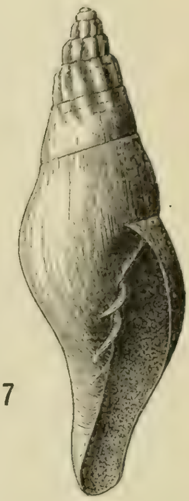
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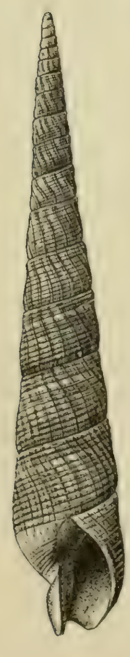
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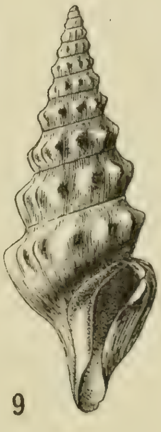
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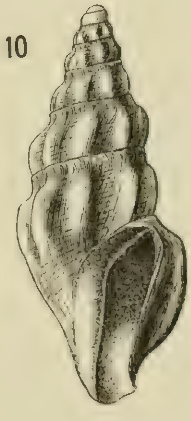
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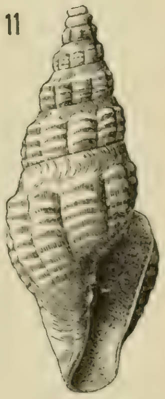
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PLATE XXXVII.

Fig. 1. *Cancellaria* (*Trigonostoma*) *Smithii* Dall; 10.5. Page 129.

" 2. *Calliostoma aurora* Dall; lat. 26.5. Page 366.

" 3. *Ringicula nitida* Verrill; 7.5. Page 43.

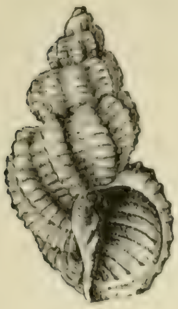
" 4. *Pleurotomaria* (*Entemnotrochus*) *Adansoniana* Crosse and Fischer; major diam. 88.0. Page 400.

" 5. *Pleurotomaria* (*Perotrochus*) *Quoyana* Fischer and Bernardi; major diam. 48.0. Page 397.

" 6. *Gaza Fischeri* Dall, enlarged three fifths; diameter of specimen, 25.0. Page 354.

BLAKE MOLLUSCA.

PLATE XXXVII.



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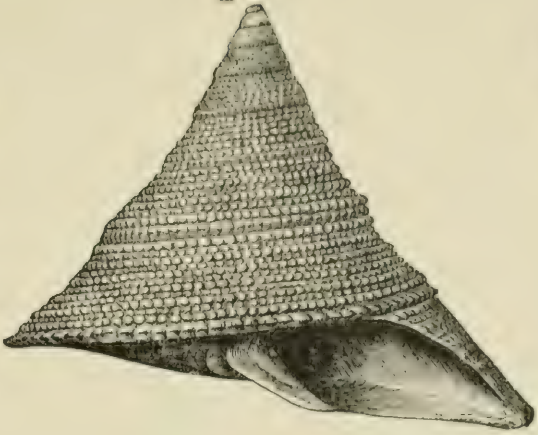

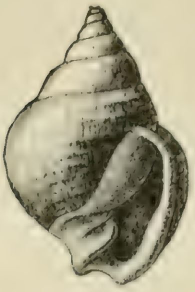

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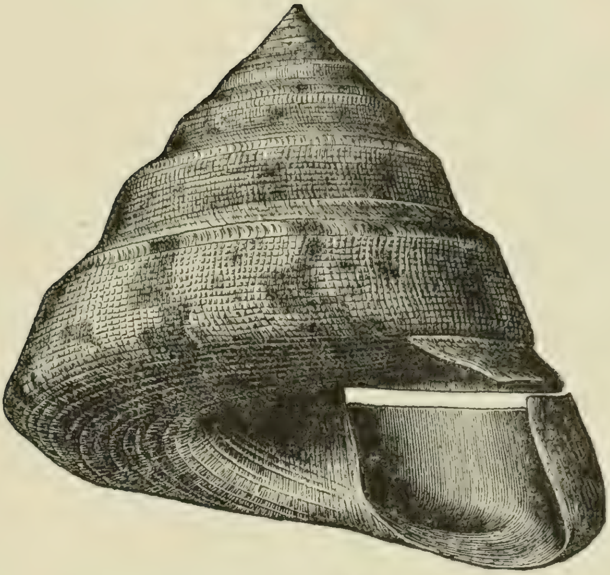

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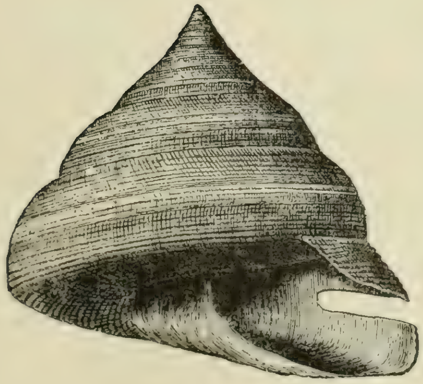

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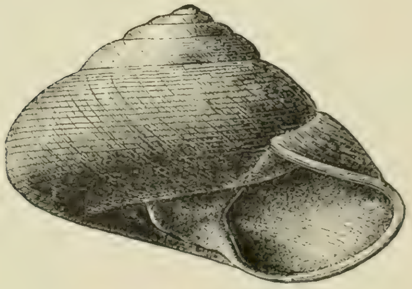

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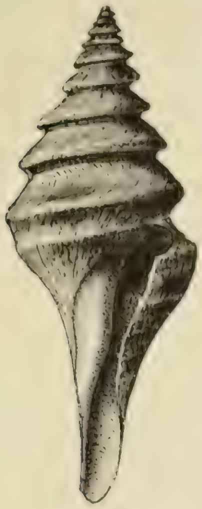
PLATE XXXVIII.

Fig. 1. *Pleurotoma* (*Leucosyrinx*) *subgrundifera* Dall; 30.0. Page 77.
" 2. *Marginella Watsoni* Dall; 9.5. Page 137.
" 3. *Pleurotoma* (*Ancistrosyrinx*) *elegans* Dall; 27.0. Page 78.
" 4. *Vermetus* (*Petaloconchus*) *erectus* Dall; 25.0. Page 262.
" 5. *Typhis* (*Trubatsa*) *longicornis* Dall, adult; 23.0. Page 216.
" 6. *Leptothyra induta* Watson var. *albida* Dall; 7.0. Page 352.
" 7. *Mitra Swainsoni* Broderip var. *antillensis* Dall; 80.0. Page 158.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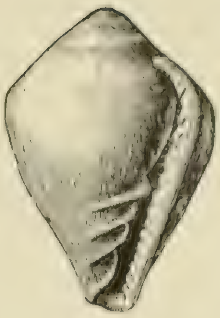
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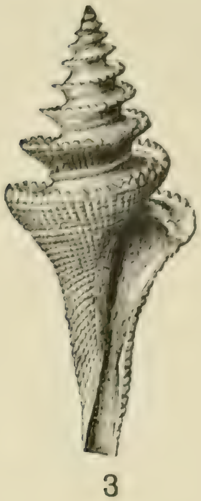
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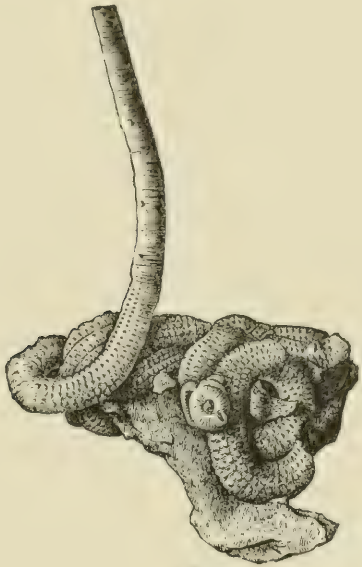
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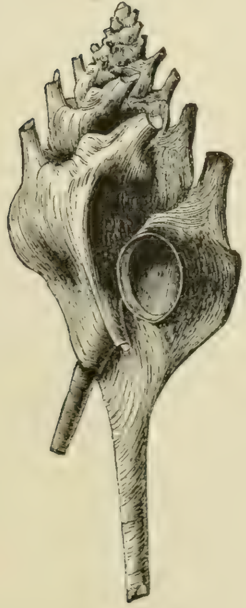

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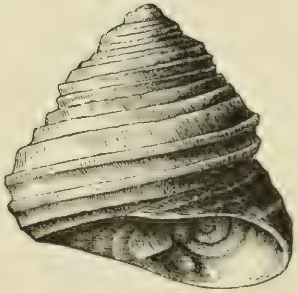

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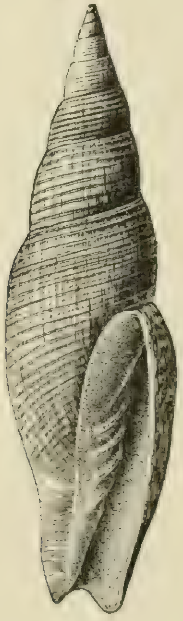

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PLATE XXXIX.

Fig. 1. *Bushia elegans* Dall ; 12.5. Part I., page 309. Part II., page 440.

" 2. *Cetoconcha bulla* Dall ; interior of left valve ; 13.0. Part I., pages 281, 283. Part II., page 440.

" 3. *Cetomya elongata* Dall ; left valve ; 22.5. Part I., page 283.

" 4. *Verticordia perversa* Dall ; 5.0. Part I., page 289.

" 5. *Cetoconcha bulla* Dall ; left valve ; 13.0. Part I., pages 281, 283.

" 6. *Terebratula cubensis* Pourtalès, side view of shell adhering to a bit of coral, natural size. Part I., page 199.

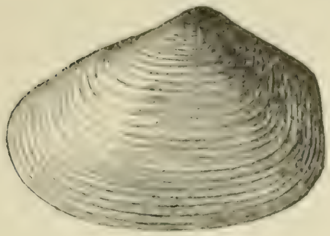
" 7. *Verticordia (Euciroa) elegantissima* Dall ; left valve of old individual, natural size. Part I., page 291.

" 8. *Terebratulina Cailleti* Crosse, young specimen considerably magnified ; Part I., page 202.

" 9. *Eudesia floridana* Pourtalès, natural size. Part I., page 202.

" 10. *Terebratula cubensis* Pourtalès ; interior of hæmal valve enlarged about one fourth, from an original drawing by W. H. Dall. Part I., page 199.

" 11. *Eudesia floridana* Pourtalès ; interior of hæmal valve, natural size, from an original drawing by W. H. Dall. Part I., page 202.



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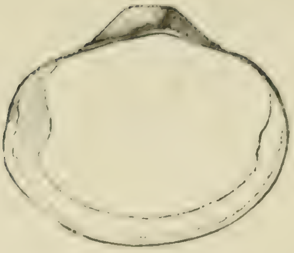

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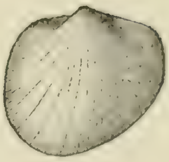

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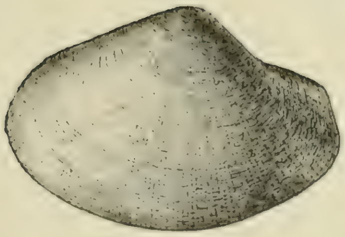

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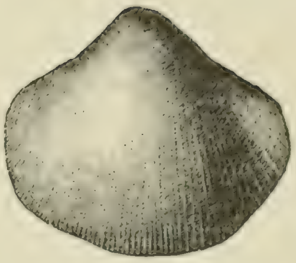

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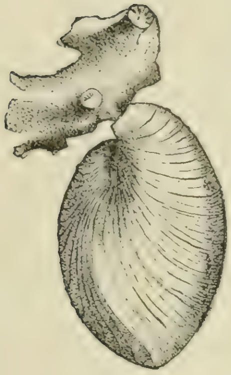

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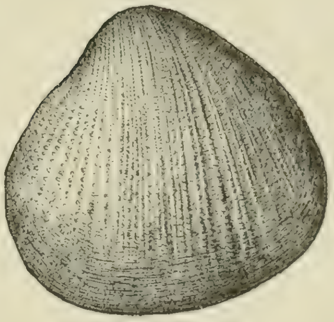

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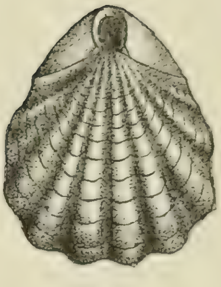

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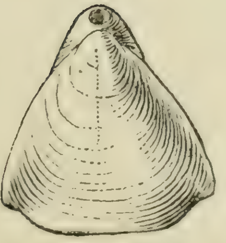

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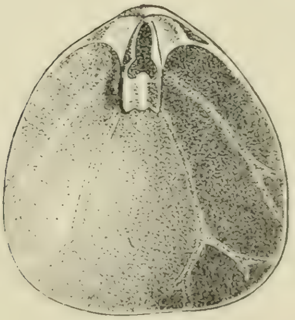

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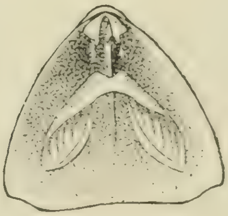

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PLATE XL.

Fig. 1. *Pecten phrygium* Dall ; 36.5. Part I., page 217.

" 2. *Cuspidaria microrhina* Dall, dorsal view of right valve, natural size ; Part I., page 295. Part II., page 440.

" 3. The same, side view.

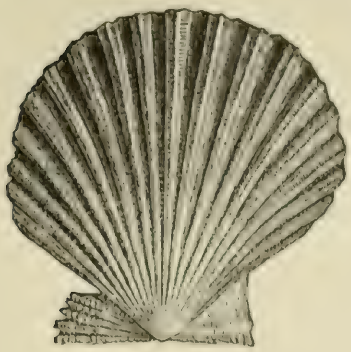
" 4. *Cardium* (*Fulvia* ?) *peramabilis* Dall ; $\frac{3}{1}$. Part I., page 269.

" 5. *Callocardia* (*Vesicomya*) *venusta* Dall ; 19.0. Part I., page 274. Part II., page 439.

" 6. *Amusium Dalli* E. A. Smith, natural size. Part I., page 209. Part II., page 434.

" 7. *Meiocardia Agassizii* Dall ; 22.0. Part I., page 271.

" 8. *Tindaria amabilis* Dall ; 15.0. Part I., page 255. Part II., page 438.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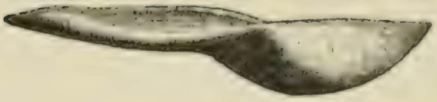
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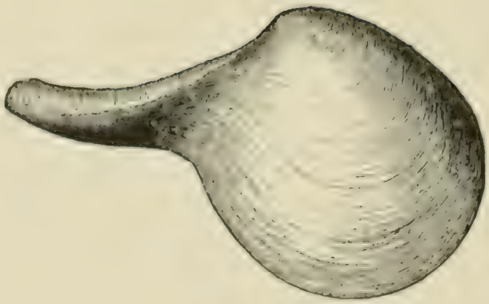
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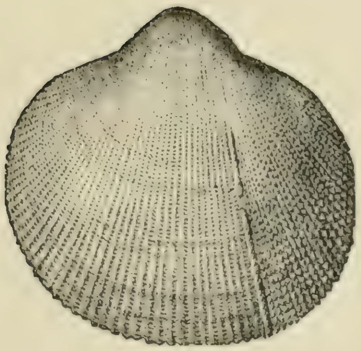
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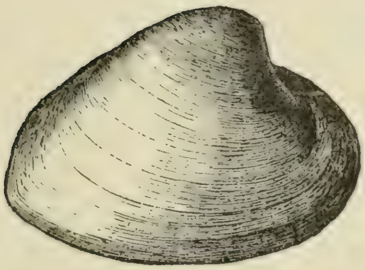
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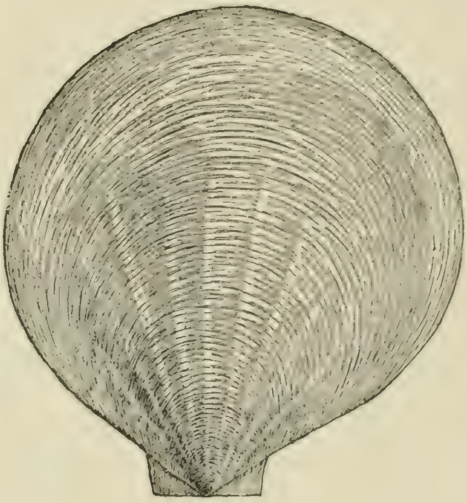
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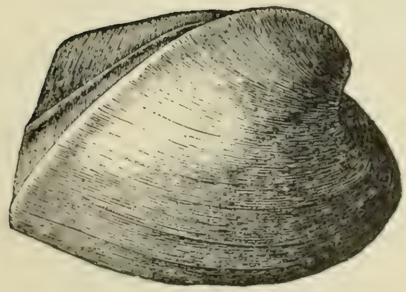
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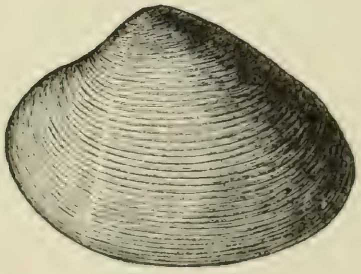
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